pit and quarry

THE BASIC MAGAZINE IN A BASIC INDUSTRY

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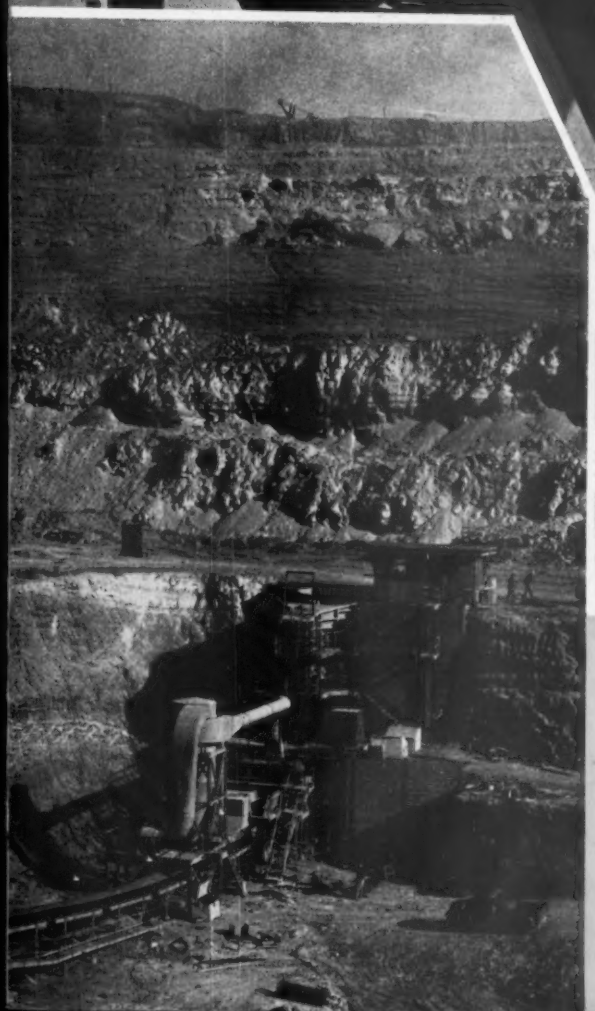
AUGUST 1961



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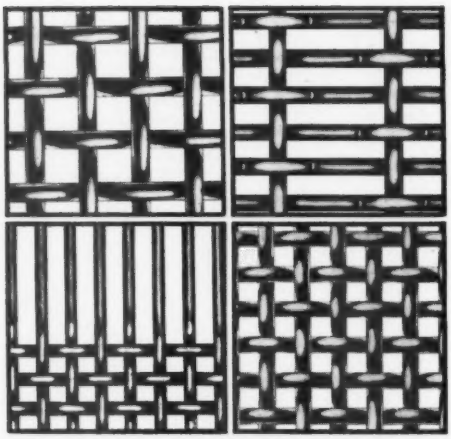

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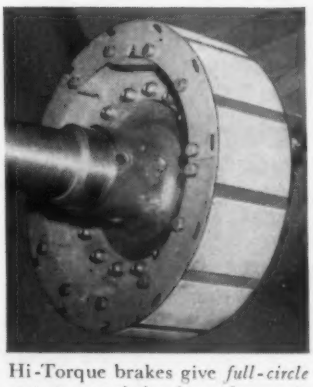

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B.F.Goodrich **Hi-Torque brakes**

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PIT and QUARRY

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NUMBER OF COPIES PRINTED THIS MONTH
21,550

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To subscribers: When requesting change of address, kindly send old as well as new address.

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Take a tip from these rock producers and get the full story from a Northwest man.

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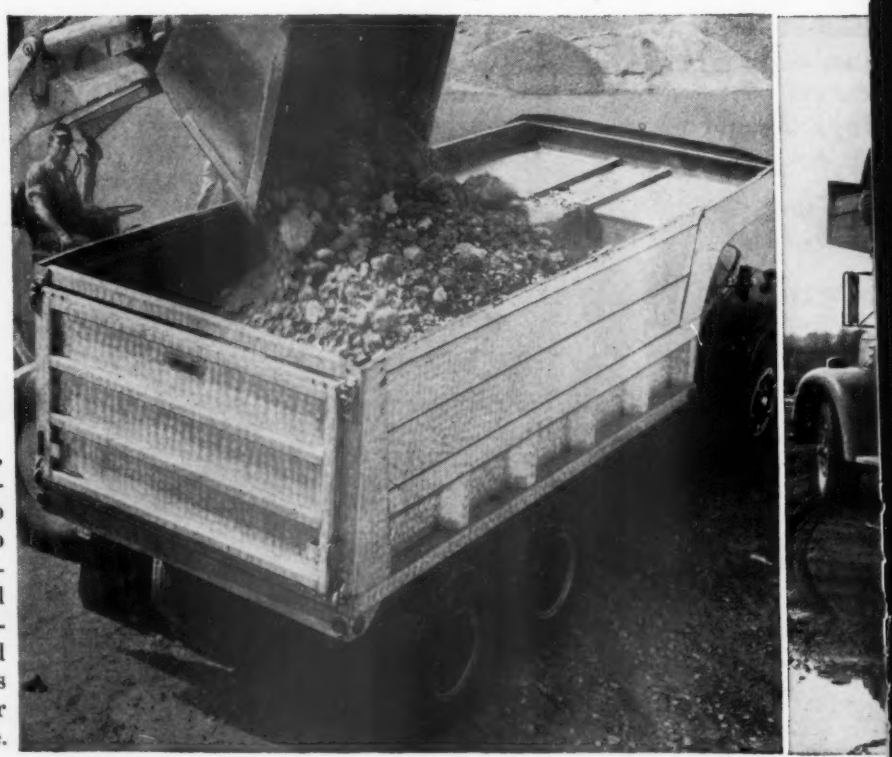

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When you trim a pound of dead weight from a rig, you take on an extra pound of payload worth a dollar per year in extra revenue. Producing earnings as much as 16 per cent above average, lightweight dump bodies of Alcoa® Aluminum can pay for themselves in less than a year of operation. From then on, it's *all extra profit* for the operator.

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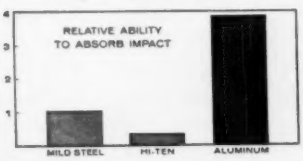
A dump body folder, which tells how many operators have increased profits by switching to aluminum, is yours for the asking. Write to Aluminum Company of America, 1792-H Alcoa Bldg., Pittsburgh 19, Pa.



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Two Aggregate Plant Owners

966 WITH A 4-YD. LIGHT MATERIAL BUCKET LOADS 25% FASTER, WORKS MORE STOCKPILES

CRUSHED ROCK PRODUCTS, INC., Schenectady, N. Y., wanted a dependable, big-capacity wheel loader for their two-shifts-a-day limestone plant. They bought a new 140 HP* Cat 966 Wheel Loader. Results? "It's doing better than we had hoped," says Plant Supt. Carl Alger. "Production's up 25% over our elevating bucket loader, and the 966 can run from one stockpile to another in a hurry."

Alger's satisfaction is no surprise. Other plant owners report low-cost high production is routine with the 966 because Cat power shift transmission, automatic bucket positioners and power-boosted steering and brakes do all of the heavy work, make the operator's job easier. Fast cycle time is maintained from the beginning to the end of each shift.

Power shift gives him instant shifting, forward and reverse, first and second speeds. Dual ratio steering, exclusive on the 966, boosts production too. In work range the operator can make a full turn with only a half whirl of the steering wheel—makes speedy loading cycles easy; for fast travel between stockpiles, or on the highway, the travel range gives safe, automotive steering response.

Production—good; availability—good; and how about maintenance? Operator Jim Galusha reports everyday maintenance takes only five to ten minutes. He adds that it's easy to climb on and off the wide-open 966—a handy feature when you're on and off a machine all day long. "Visibility," he says, "is excellent even with the big 4-yd. special bucket."

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Enter 9 on card, page 155 →

Report on Cat Wheel Loaders

944 FEEDS HOPPER—600-FT. ROUND TRIP IN 57 SECONDS—LOADS TRUCKS, DOES UTILITY WORK

BURBANK ROCK COMPANY, Ponca City, Oklahoma, needed a fast-moving general-purpose wheel loader to feed their screening-washing system and load out finished product. Their Caterpillar Dealer recommended the 944 with a 2-yd. bucket. Leo York, plant superintendent, reports they use the 944 about half the time to charge a hopper with ½-in. limestone chips for screening and washing. The rest of the day the 944 loads trucks from stockpiles, moves equipment around the plant and does general maintenance work.

The 944's profile tells you it's the machine to handle many jobs. Bucket lift arms and cylinders are forward, giving the 944 the reach and lift for easy loading of hoppers, trucks or railroad cars. Operators push the 944 hard, too, because they're not bothered by mechanisms raising and lowering beside them. Never have to worry about a load spilling back on them, either.

The 944 is powered by a thrifty, 105 flywheel horsepower turbocharged Cat Diesel Engine, with a gasoline engine optional. The same option applies to the 80 HP* 922.

One common equipment requirement of aggregate plant operators is machine endurance. You want low-cost, long-time, fast production without maintenance headaches. That's why more and more plant operators rely on Cat Wheel Loaders. If you need a powerful loader with fast wheel mobility and a wide range of bucket sizes, check with your Caterpillar Dealer. He'll solve your loading problems for a long time to come.

* All horsepower specifications are flywheel ratings.

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Washington News Letter

By S. HERBERT UNTERBERGER

THE FACT that recovery from the recent recession is underway is no longer news. The question being asked around Washington is whether or not, once the pre-1960 recession level is again reached, will there be further upward movement. It will be remembered that one of the principal subjects discussed by Kennedy when he was a presidential candidate was the rate of economic growth. He promised, unequivocally, that any administration which he headed would have as its principal objective a speeding up of this rate of growth.

An early Administration effort along this line was the suggested incentive tax program discussed in this department last March. That program no longer has any chance of passing in its original form. Administration economists do not believe that the substitute program now being considered in Congress (which would provide a flat 7 or 8 percent tax credit in place of the original sliding scale) provides anywhere near the same incentive to increase capital investment.

Since this new ingenious attempt at encouraging more rapid growth seems to be meeting with less than complete enthusiasm, the Administration is turning rapidly to some old tried-and-true methods—principally, the rapid expansion of Federal Government expenditures. In the year just ended on June 30, 1961, the Federal Government spent in cash approximately 99 billion dollars. Its income was less than 98 billion dollars, leaving a deficit of about one and a half billion dollars.

In the current year, the one that began on July 1, 1961, cash outgo is to be a great deal higher—about 108 billion dollars. Cash income will also be higher, but the increase will not be so great. The cash income is currently estimated to be around 102 billion dollars, which would leave a deficit in the neighborhood of 6 billion dollars.

There is no longer much question that such an increase in expenditures over income will serve as a business stimulant. It will, of course, also serve as a stimulant to inflation. The difficult choice which always has to be made is whether the stimulant to business is more advantageous than the inflation is disadvantageous. The Kennedy Administration has so far decided that it is beneficial, at least for its immediate purposes.

This increase in expenditure is being distributed very broadly. Some of it will go to elderly people, who will get bigger pension checks. Men will be able to get them sooner and they will be permitted to start their retirement at age 62 instead of age 65. Widows will get a 10 percent increase in Social Security benefits. The unemployed and those on relief will also be able to obtain higher benefits since welfare costs are likely to rise substantially.

Important beneficiaries of this increased federal outlay will be the industries supplying the defense establishments, particularly those engaged in missile development and research. One of the most surprising current developments in Washington is the ease with which the Administration's ten year, 35-billion dollar space exploration program is moving through Congress. Almost no questions are being raised either about the usefulness of sending men to the moon or about the very high cost of accomplishing this objective. Almost without discussion, the Senate approved a 1.8 billion dollar authorization for the current fiscal year to get the program started. There is virtually no doubt that the House of Representatives will go along with the program.

Congressmen are receiving almost no mail on this subject, and so they theorize that either it is very favorably received or it is so complicated that their constituents are fearful of voicing an opinion about it. Nevertheless, the Federal Government is committing itself to make large expenditures in this area for at least ten years to come.

An indirect beneficiary of the increased expenditures for defense will be the construction industry. Space programs require not only large buildings for production but also large launching arrangements. Also needed are roads to get to and from these installations, which are frequently located in rather obscure places.

In addition, the road building segment of the construction industry is due for a lift because of the acceleration of the program to complete a 41,000-mile network of interstate highways. In the current fiscal year, the Federal Government expects to spend in excess of 2 billion dollars on this program—some 400 million dollars above the previous year. In future years, these outlays will continue to rise.

But the most direct aid to the construction industry is to come out of the Housing Act which became law recently. This is the most costly Housing Act in United States history. It authorizes expenditures which could run up as high as 5.5 billion dollars.

Its most substantial impact will probably come in the direct home building field, where the act makes an extraordinary effort to permit moderate income families to buy their own homes even though they have very little in the way of savings to invest in the transaction. For the first time, a family with less

(*Concluded on page* 68)

ONE TON FOR 6 CENTS...Total Digging and Hauling Cost with a Sauerman

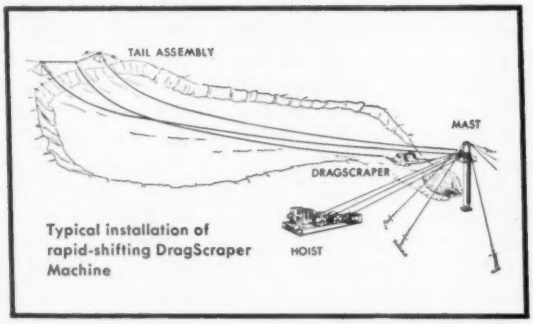
Dig and haul from your high bank, deep pit or underwater deposit direct to plant hopper or stockpile for 6 cents per ton. This cost is based on current job figures for Sauerman DragScrapers operating over average depth and haul distances.

The reason: one man and one machine handle the entire job. You save money three ways over multiple machine methods. Your power costs are much lower. A single operator replaces two or more on your payroll. Your maintenance costs are much lower because only the DragScraper Bucket and cable contact the material handled.

If you are hauling over distances up to 800 ft. or digging under water at depths to 100 ft.—the Sauerman DragScraper Machine is the most economical means you can use.

You can get DragScraper Machines in sizes from ⅛ to 15 yds. to match your tonnage requirements. Write or call about the physical dimensions of your deposit. We'll recommend the proper machine. For general information and detailed data on specific installations request Catalogs A and SG-1.

Plant Operators Are Saving On Power, Labor And Maintenance With Sauerman DragScraper Machines



Typical installation of rapid-shifting DragScraper Machine

DragScraper Bucket deposits load of sand onto grizzly hopper.

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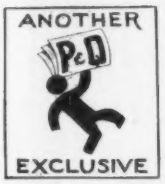
Labor Developments



THE most important labor development in the summer of 1961 is the bargaining for a new labor agreement in the automobile industry. Although the Kennedy Administration has faced a number of labor crises since it took office (for example, the strike against the airlines, the strike in the maritime industry, and the difficulties concerning the atomic energy and missile installations), nothing has compared with the challenge which it will face in the automobile industry should an agreement not be reached through the normal channels of collective bargaining by the time the contract expires on August 31.

A strike in this key sector of the economy could upset the whole trend toward economic recovery, which appears to be progressing reasonably satisfactorily so far. Indeed, if this trend *is* interrupted, the political impact during the Congressional elections of 1962 could result in a serious weakening of the Democratic party's control of the Congress and a stymieing of the President's program.

There is more at stake than just the matter of a serious strike. Traditionally, collective bargaining in the automobile industry has initiated economic developments which have spread rapidly far beyond the boundaries of that industry. Among the best known are: the introduction of cost-of-living escalator clauses into a major labor agreement, the inclusion of regular productivity increases, and the beginning of agreed-upon supplementary unemployment benefit programs. Each of these has been copied later (and often improved upon) by other large mass production industries. The steel-

By S. HERBERT UNTERBERGER

S. Herbert Unterberger and Company
Economists-Consultants on Labor and Industrial Relations
Washington, D.C.-Philadelphia, Pa.

workers union has almost made a pattern of learning from every gain made by the automobile workers and, thereafter, negotiating a better deal in its industry.

Each such innovation in the automobile industry has added a substantial amount to labor costs. Many critics have regarded this as one of the prime causes of the post-World War II inflation. It is principally for this reason that the Administration, as well as others who are concerned about the deleterious effect of inflation, are "holding their breath" to see what new ideas the auto workers are going to present this time.

The Administration has made it clear, through the pronouncement of the members of the Council of Economic Advisers and the President's Advisory Committee on Labor-Management Policy, that it would hope for restraint on the part of the union and management in bargaining over economic issues. Coming from an Administration which is holding office by virtue of a narrow margin of victory due, almost entirely, to the support of the labor movement and, particularly, to the support of the automobile workers union, this statement puts the union at a serious public relations disadvantage in strongly asserting demands for large economic improvements.

This disadvantage is undoubtedly one of the forces contributing to the unprecedented manner in which negotiations were opened by the union—namely, without a catalog of demands. Indeed, restraint was the hallmark of the early stages of negotiations; instead of stating firm demands, the U.A.W. talked about solving problems in particular areas.

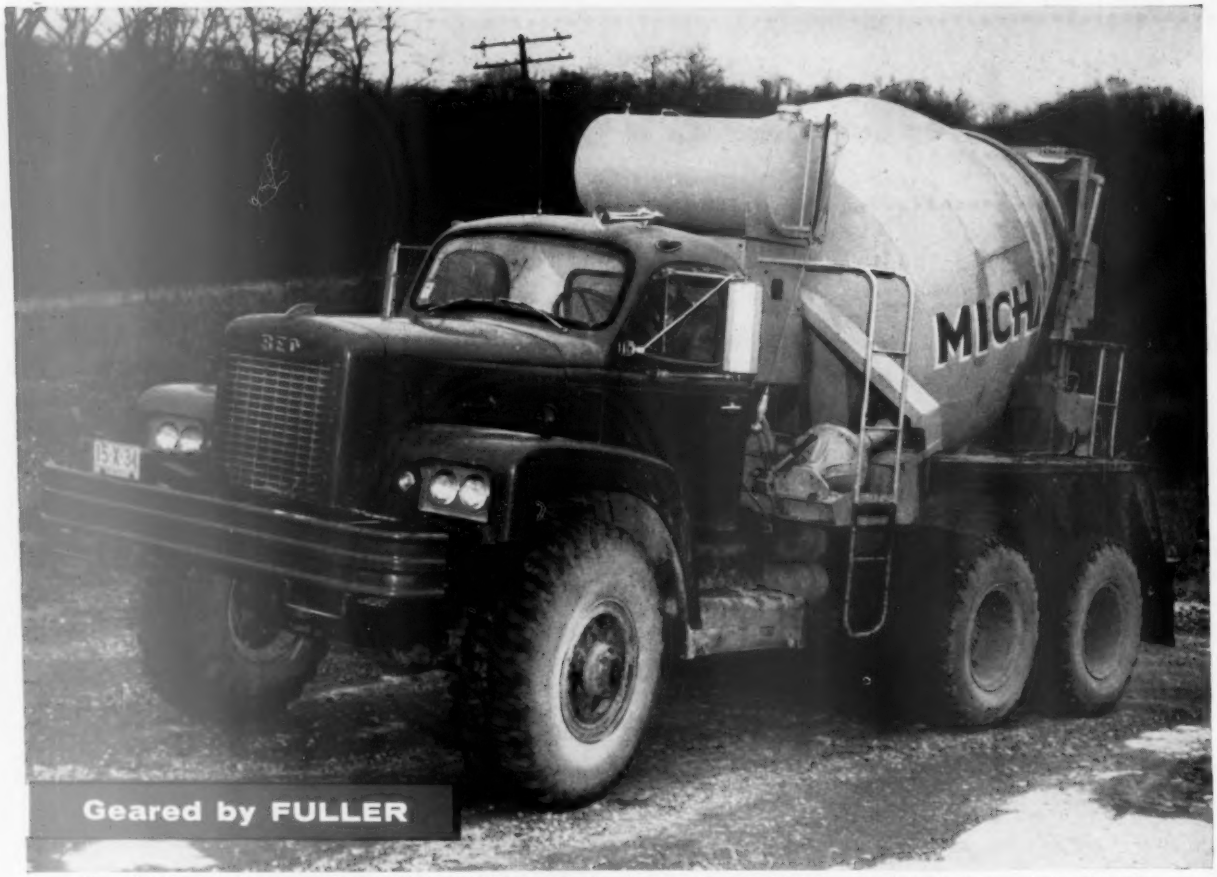
Among these problems is the growing question of automation. The union wants the workers to share from its benefits in some manner. A more specific suggestion was that salaries shall be substituted for hourly wages for the rank and file production workers. There was also presented the perennial suggestion that a shorter work week would be appropriate, particularly in view of the present need for the solving of the problem of the large numbers of unemployed auto workers. For the same purpose, longer vacations and earlier retirements are suggested regularly.

On the straight economic issues, however, while not specifically spelled out, there appears to be the underlying assumption on the part of the union that the productivity increases (which add approximately 7 to 8 cents an hour each year) should be continued as well as the cost-of-living adjustments. There is a growing belief that, in addition, one of the principal economic demands will be the shifting to the employer of the workers' present half share of health insurance payments. This would be tantamount to an increase of 8 or more cents per hour.

Whether or not an agreement which included all or most of these features would be regarded as sufficiently restrained to avoid Administration criticism can not be known at this time. However, it is likely that if the minimal bargaining results would be the continuation of present contractual provisions or small improvements in them, this would probably be satisfactory to the outsiders. But such might prove to be unsatisfactory to the union's membership.

The principal reason is that such an agreement would accomplish

(*Concluded on page* 68)



One of Michael's Fuller-equipped Reo F-505 6 x 6 OH Transit Trucks. The power is transmitted through a Fuller R-35 7-speed ROADRANGER to a 2.55:1/1.00:1 transfer case and 7.59:1 front and 7.54:1 rear axles.

R-35 ROADRANGERS from Pit to Patio

"We have more than doubled our business in the last three years," Vern Michael, owner of Michael Concrete Products, Inc., Loveland, Ohio, says. "Since we bought our first big Fuller-equipped Reo in 1957, our trucks always come through on deliveries. That Fuller R-35 ROADRANGER Transmission should be given a major portion of the credit for this performance. It has the get-up-and-go we need to get thru the rough construction sites where we operate."

Fuller R-35 RoadRanger features:

- No gear splitting – 7 selective and progressive gear ratios
- Easier, quicker shifts – closely spaced and equal ratios in the operating range
- One shift lever controls all 7 forward and 1 reverse speeds
- Engines work in peak hp range with greater fuel economy
- Compact transmission—only 375 lbs., 26-25/32 inches in length

RATIOS

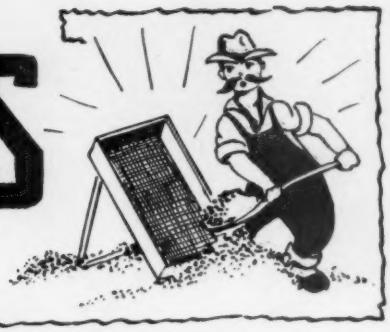
Gear	Std.*	Opt.**	% Step
Seventh	1.00	1.00	
Sixth	1.33	1.24	*33 24**
Fifth	1.79	1.67	34.8
Fourth	2.42	2.25	34.8
Third	3.30	3.06	36.5
Second	4.90	4.55	48.6
First	8.20	7.62	67.3
Reverse	7.63	7.09	

Weight . . . . 375 lbs.
Oil Capacity . 16 pts.

FULLER TRANSMISSION DIVISION
EATON MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN

Sales & Service: West. Dist. Branch, Oakland 6, Cal. • Southwest Dist. Office, Tulsa 3, Okla. • Automotive Products Co., Ltd., Brock House, Langham St., London W.1, England, European Rep.

SCREENINGS



By RAY L. SMITH JR.

A GREAT AMERICAN chief of naval operations will hang up his scrambled-eggs hat and ribbon-bedecked blouse this month when he will secure from sea.

A small part of the farewell so effectively delivered by "31-knot Burke" is reproduced in Screenings this month.

Admiral Arleigh A. Burke, previously the highest ranking officer in the United States Navy, became known as "31-knot Burke" during World War II when he was Chief of Staff of Carrier Task Force 38 in the Pacific. The 31 knots referred to the speed at which he drove his destroyers against the enemy.

When Arleigh Burke grins, you grin with him. When he chuckles, you laugh aloud. You don't have to wonder when he is going to do either for the sudden twinkle in his bright blue eyes flashes across to your mental radar screen as he is about to say something that will surprise you.

Admiral Burke says we must make up our minds if freedom means anything to us, we must sacrifice some of the luxuries to which we have become accustomed, and buckle down to engage the Communists in every field in which they wish to compete. If we are willing to do that, he says, there is no question of our survival, and our grandchildren will live to see the Communist evil gone from the face of the earth.

"Guts," Admiral Burke warns, is our biggest need. We cannot wash our hands of a moral and ethical problem simply by setting up more organization. We have got to face our problems squarely.

"The greatest danger we face today is that we are unconsciously adapting ourselves to the Soviet's ground rules. One of them is that the battle ground of the cold war is on Free World territory. It is never within the Soviet bloc. The Free World has tacitly accepted the Soviet Union's dictum that it may meddle or attack beyond its borders, but that the Free World must not concern itself with trouble within the territory under Soviet Control.

"Our nation has grown accustomed to thinking the only problem we face is that of adequate deterrence of an all-out attack. The hard fact is that the cold war in which we are now engaged will last just as long as we shall live. How we make out in this war will be largely dependent upon what we, as a nation, are willing to do, how hard we are willing to work, whether we have enough strong men to shoulder the public interest and let their private interests go.

"We must face the moral issue of less frills and more sinew. And we must be willing to comuete in full force with our enemy. If we fail on either score, we will go the way of all civilized nations before us that failed the same test."

TO THE OFFICERS AND MEN OF THE UNITED STATES NAVY:

There comes a time in every man's life when he must attempt to evaluate what he has done to better his country, his service, his family, and his group. This review can very well comprise the legacy a man bequeaths to his successors.

I have now—with more than a twinge of reluctance—reached this stage, and in retrospect I find it impossible to single out any one item which I can truthfully say was exclusively and inalienably mine. This is a truism which most men recognize eventually because they learn that major accomplishments can be achieved only with the cooperation of friends and shipmates.

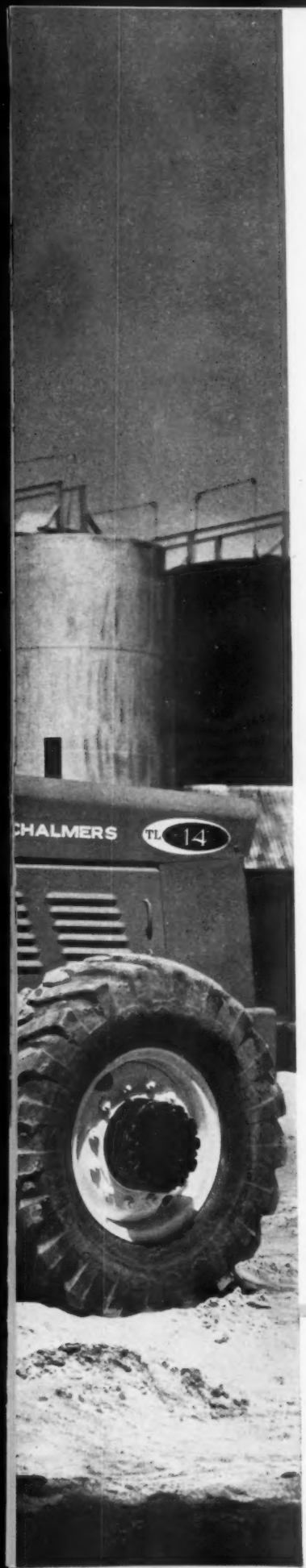
In forty-two years of naval service I have had a unique opportunity to serve my country which I deeply appreciate. I have also been blessed by the loyalty, support, and friendship of the most dedicated people I have ever known, not the least of whom is my devoted wife.

Experience has brought me a full appreciation of the prize cargo a man can hoist aboard. To this beloved Navy I do commend:

Love of country, overshadowing all other loves, including service, family, and the sea.
Individual desire to excel, not for aggrandizement of self, but to increase the excellence of the Navy.
Devotion—perhaps consecration—to personal integrity in oneself, in one's service, in one's country.
Courage to stand for principle, regardless of efforts to dilute this courage through compromise or evasion.

My service life has been rich and rewarding, and no man can ask for more. May you, too, find satisfaction and, throughout your careers experience fair winds and following seas.

ARLEIGH BURKE



DUMP CYLINDERS STAY OUT OF THE DIRT

On all Allis-Chalmers tractor loaders dump cylinders are placed near the center of gravity, out of the dirt and grit that can score piston rods . . . damage entire hydraulic system.

Instead of mounting dump cylinders on the bucket, Allis-Chalmers puts them up and away from abrasives that can cause scoring of piston rods or get into vital hydraulic components and ruin the entire system. In addition, this dump cylinder location brings greater loader stability . . . no extra weight to lift with bucket . . . fewer moving parts.

Other tractor loader advantages you'll like are: *Single lever speed and direction control; pin-connected axles* that hold tight under load; *extra stability* from extra-long wheelbase; *high lift—added reach* for fast, even dumping even into side-boarded trucks; and *5-way hydraulic filtering* protection that means less downtime . . . extended loader life.

Watch Allis-Chalmers loaders at work. Be convinced of their many design and construction advantages that improve your profit picture. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

Allis-Chalmers offers 6 tractor loader models—ranging in power from 76.5 to 184 horsepower—in carry capacity from 3,600 to 10,500 lb and with buckets available from 1 to 6 cu yd.

STEP UP YOUR

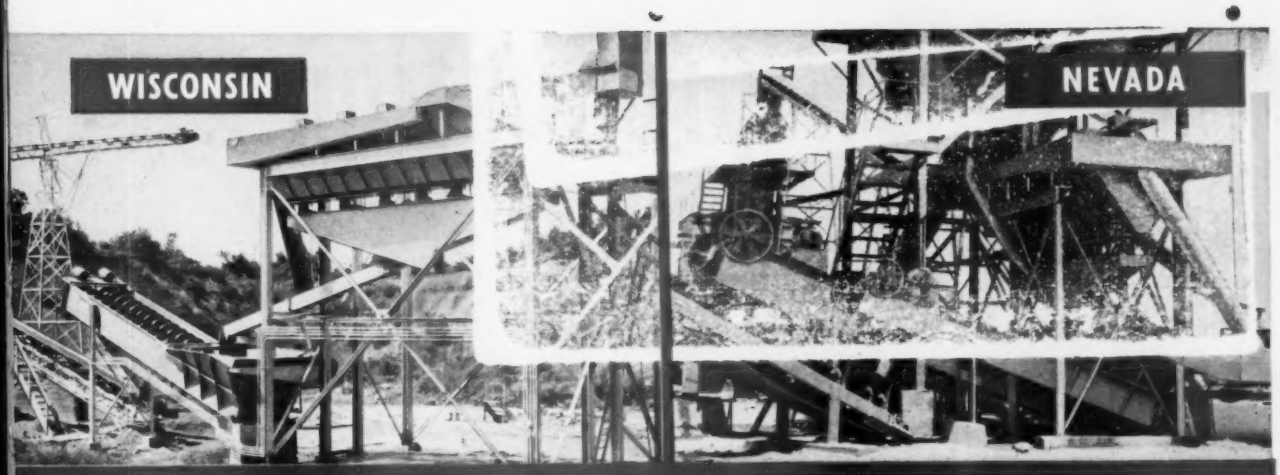
Performance
Operator comfort
Wearability
Ease of maintenance
Reliability

WITH **ALLIS-CHALMERS**
POWER FOR A GROWING WORLD

Enter 16 on card, page 155

when "specs" are hard to meet

aggregate producers depend on . . . . . .



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SCRUBBING, DEWATERING and CLASSIFYING EQUIPMENT

● What does it take to meet the toughest specs? Knowing how is not enough. You have to have the equipment that *can* do it. And do it efficiently . . . exactly . . . consistently. That means Telsmith equipment! You can depend on Telsmith to turn out washed aggregate that is first-quality clean, and precisely graded. Equally important, Telsmith is tops in production capacity *and* economy. That's why hundreds of Telsmith classifiers of all types are in use throughout the world. The Telsmith line is complete. You can get exactly the right unit or combination of units to meet your needs. For reliability and profit you cannot buy better equipment.

For helpful pictures, tables, and complete information, including sizes and capacities, *send for free Bulletin 292.*

E-19—760

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Cable Address: Sengwerks, Milwaukee • Representatives in Principal Cities in all Parts of the World

roll up new production... and profit...records

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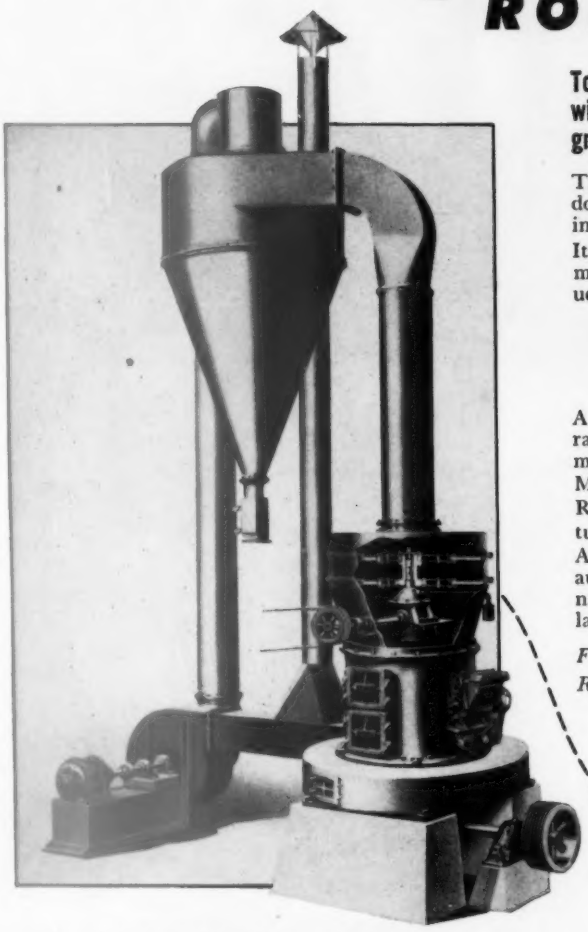
Raymond ROLLER MILLS



RAYMOND MULTI-PURPOSE ROLLER MILL
WITH DOUBLE WHIZZER AIR SEPARATOR

Top performing RAYMOND Multi-Purpose ROLLER MILLS with WHIZZER AIR SEPARATION lead the field in fine grinding in the CHEMICAL and PROCESS INDUSTRIES.

This Mill combines the Raymond High Side Roller Mill and the double Whizzer Separator to afford great versatility and economy in the handling of many fine grinding problems.

Its wide scope of application covers the preparation of powdered materials . . . from simple fillers to fancy chemicals. Typical products pulverized include . . .

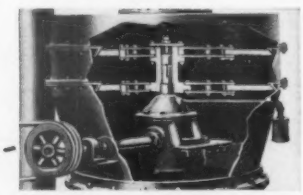
PIGMENTS • FULLERS EARTH • INSECTICIDES • IRON OXIDES • TALC • BARYTES • KAOLIN AND CLAYS • SULPHUR • CARBON MIXTURES • STARCH • LIMESTONE • BAUXITE • CALCIUM SILICATE •MINERAL FILLERS • PHOSPHATE ROCK • GYPSUM.

A single, easy adjustment of the Whizzer controls the fineness range from 20-mesh grades to products essentially all minus 325-mesh.

Mill capacities reach 40 tons per hour and more with a Super Roller Mill. Flash Drying Accessories may be installed when moisture removal is required.

All aspects of Fine Grinding are combined in a clean, dust-free, automatic system that is economical in operation and maintenance. Installations are flexible and readily adaptable to any plant layout.

For detailed information send for the Raymond Roller Mill Catalog Number 79 Q



Mills are available with Single or Double Whizzer Separators. Whizzers have set of radial blades attached to a disk that revolves on a vertical shaft in separating chamber. Variable speed drive insures finger-tip control of fineness.

COMBUSTION ENGINEERING, INC.

Raymond Division

Combustion Engineering-Superheater Ltd.
Montreal, Quebec, Canada

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Greater power, faster pace produce more tons per day

Forty engine horsepower gives the John Deere "1010" Crawler-Loader the kind of performance needed to keep trucks moving, hoppers filled, conveyors operating at capacity.

Efficient operating controls give you full benefit of the unit's work capability. Hydraulically operated direction reverser with wet clutch saves time and effort, eliminates clutching and gear-shifting from forward to reverse, provides a reverse to match every forward speed. Same wet-clutch packs soak up shocks to the transmission, extend machine service life.

One lever controls all functions of loader operation—digging, lifting, dumping. Dump clearance of over 8 feet, breakout force of 8,500 pounds and full-height lift of 4,000 pounds make the "1010" Crawler-Loader a profit-producer for operations of nearly every size. Gasoline or Diesel options match "1010" power to your spread.

Purchase may be made on terms of the John Deere Credit Plan or long-term leasing arranged through the John Deere dealer. For information, locate your John Deere dealer through the yellow pages of your phone directory now, or write John Deere, 3300 River Drive, Moline, Illinois.

JOHN DEERE

LOADERS
BULLDOZERS
AND
MATERIAL
HANDLING
EQUIPMENT

HOLES TO 5⅝"

GO-DOWN FAST and EASY with the ALL-NEW, ALL-HYDRAULIC C-350 REICHdrill

...and you can't beat it for drilling speed, stability, mobility!

CRAWLER-MOUNTED C-350

NOMINAL HOLE SIZE—1⅞" to 5⅝" • DOWN PRESSURE—10,000 LBS. • ROTARY SPEED to 540 RPM

Easy Operation is assured by all-hydraulic, labor-saving controls. *Stability* is provided by 14" wide tracks, low center of gravity and 8'8" wide frame plus 3 REICH heavy-duty hydraulic leveling jacks. *Mobility* is high because the crawler-mounted 350 trams at 7.8 MPH; climbs 25% grades, turns in its own length. *Versatility* is basic in REICHdrill design. The 350 is at home blastholing with 3-cone rotary bits, In-Hole Drills, or drag bits; and whether coring or prospecting.

A truck-mounted T-350 REICHdrill for greater mobility with all the above advantages, is also available. Get detailed specifications.

Ask for SP-5001-2

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FRANKLIN (VENANGO COUNTY), PENNA.

Division: CHICAGO PNEUMATIC TOOL CO.

News of the Industry

$7,500,000 Expansion Begun at Arkansas Cement To Double Capacity

Preliminary site work has begun on new construction which will double the capacity of the Arkansas Cement Corporation plant at Foreman, Ark., about 40 miles northwest of Texarkana. Scheduled for completion within a year, the company's $7,500,000 expansion program is designed to increase capacity from 1,400,000 bbl. to 2,800,000 bbl.

Preparations are under way for the installation of a ball mill and a large kiln. These units and the components will be supplied by F. L. Smidth & Co.

The new kiln will be the same size as the one already in service—450 ft. long and 12 ft. in diameter The ball mill will be installed beside the two now in use.

Arkansas Cement Corporation, a wholly owned subsidiary of Arkansas Louisiana Gas Company, shipped its first carloads of Foreman Cement from the $13,500,000 plant in December, 1958. The plant was built by Kaiser Engineers, Inc.

October 16 to 20 are the dates for the 1961 National Safety Congress and the annual convention of the National Safety Council, both of which will convene in Chicago. Industrial sessions will be held in the Hilton, Pick-Congress, and La Salle hotels.

Canadian Cement Concern To Open Distribution Plant At Site Near Rome, N.Y.

Lake Ontario Portland Cement Co., Ltd., Toronto, Ont., will open a $2,000,000 cement storage and distribution plant near Rome, N.Y., this fall.

The operation will be incorporated as Mohawk Valley Cement Company, Inc., a wholly-owned subsidiary. Cement manufactured at Lake Ontario's Picton, Ont., plant will be distributed to central, eastern, and northern New York state. (Another subsidiary, Rochester Portland Cement Corporation distributes to western New York.)

First shipments are expected to be made by November 1.

Coming Events

August 10-12, 1961 — Chicago. National Sand and Gravel Association-National Ready Mixed Concrete Association Controllers' Conference. The Edgewater Beach Hotel.

August 20-24, 1961—White Sulphur Springs, W. Va. Joint semi-annual meeting, National Sand and Gravel Association, National Ready Mixed Concrete Association boards of directors. The Greenbrier.

September 11-13, 1961—Seattle. American Mining Congress, Metal Mining and Industrial Minerals Convention.

October 2-3, 1961—Ottawa, Ont. Joint meeting, Industrial Minerals Divisions, Canadian Institute of Mining and Metallurgy and Society of Mining Engineers, American Institute of Mining, Metallurgical and Petroleum Engineers. Chateau Laurier.

October 4 and 5, 1961—Pocono Manor, Pa. Annual meeting, National Slag Association. Pocono Manor Inn.

October 5-6, 1961—Washington, D.C. Operators meeting, National Lime Association. Shoreham Hotel.

October 16-20, 1961—Chicago. Safety Congress, National Safety Council. Hilton, Pick-Congress, LaSalle, Sheraton-Chicago hotels.

November 13-17, 1961—College Park, Md. 16th annual Short Course for Industry Technicians, National Sand and Gravel Association and National Ready Mixed Concrete Association. University of Maryland.

January 15-19, 1962 — Miami Beach. January meetings, National Limestone Institute, Inc. Roney Plaza Hotel.

February 5-9, 1962 — Chicago. 32nd annual convention and biennial show, National Sand and Gravel Association and National Ready Mixed Concrete Association. Conrad Hilton Hotel.

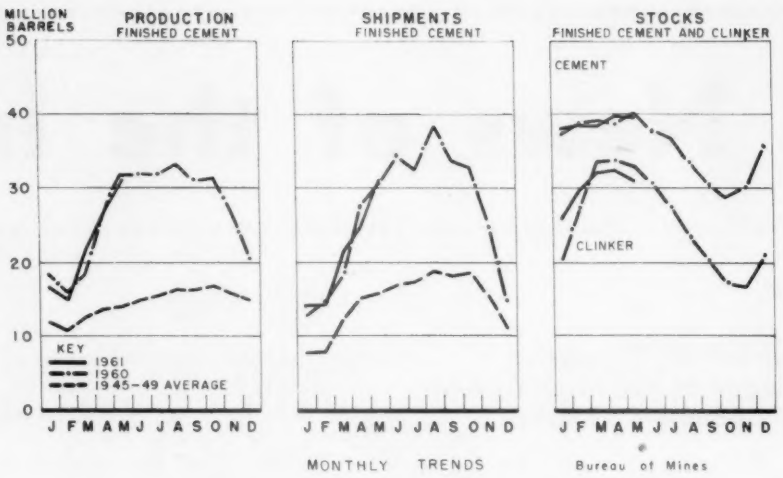
Construction Put in Place During First Half of 1961 Tops Previous Level

The value of new construction put in place in June, 1961, amounted to $5.1 billion, according to preliminary estimates of the U. S. Department of Commerce. This amount was 9 percent more than in May (compared to a normal seasonal increase of 7 percent between the two months), and 2 percent above the level in June, 1960.

Cumulative value for new construction expenditures in the first six months of 1961 was estimated at $25.5 billion, compared to $25.1 billion in the same period last year. While total private construction decined 3 percent to $17.8 billion, and private residential slipped 8 percent to $9.6 billion, total public construction expenditures increased 11 percent to $7.7 billion.

ITEMS: Private construction, estimated at $3.5 billion, was 7 percent greater than in May (compared to a normal seasonal increase of 6 percent between the two months), and about the same as June, 1960. Residential was estimated at $2.0 billion—9 percent more than in May, but 3 percent under June, 1960.

ITEM: Public construction, estimated at $1.7 billion, increased more than the normal seasonal change from May. It was up 12 percent (the usual increase is 10 percent), and was also 8 percent above June, 1960.



— May, 1961, Finished Portland Cement —

SUMMARY—Production of finished portland cement in May, 1961, as reported to the U.S. Bureau of Mines, totaled 31,102,000 barrels—a decrease of 3 percent compared with May, 1960. Mill shipments totaled 31,030,000 barrels—an increase of 3 percent compared with May, 1960. Stocks of 39,789,000 barrels of finished portland cement were 1 percent less than those on hand May 31, 1960. Clinker production totaled 29,916,000 barrels—a decrease of 5 percent compared with May, 1960.

►PRODUCTION—A total of 172 plants in 39 states and Puerto Rico reported production of 31,102,000 barrels in May, 1961, compared with 31,999,000 barrels in May, 1960.

Clinker production totaled 29,916,000 barrels, compared with 31,577,000 barrels in May, 1960.

High-early-strength portland cement totaled 1,335,000 barrels—an increase of 6 percent from the May, 1960, production of 1,262,000 barrels.

Prepared masonry cement production of 1,913,000 barrels was slightly less than the 1,918,000 barrels in May, 1960. Masonry cements are reported in 280-lb. barrels.

►SHIPMENTS—Mill shipments of finished portland cement from 176 plants totaled 31,030,000 barrels, compared with 30,185,000 barrels in May, 1960.

Shipments were higher in 14 districts and lower in 9 districts. The greatest increase was in the Colorado-Arizona-Utah-New Mexico district.

Shipments of high-early-strength cement totaled 1,377,000 barrels—an increase of 9 percent from 1,265,000 barrels shipped in May, 1960.

Prepared masonry cement shipments totaled 1,972,000 barrels—an increase of 1 percent from 1,953,000 barrels shipped in May, 1960.

►STOCKS—Mill stocks of 39,789,000 barrels of finished portland cement were on hand May 31, 1961—a decrease of 1 percent from 40,101,000 barrels on May 31, 1960. Stocks of clinker on hand May 31, 1961, totaled 30,999,000—a decrease of 6 percent from 33,096,000 barrels on May 31, 1960.

►FIRST FIVE MONTHS OF 1961—For the January-May period, the production volume of finished cement amounted to 111,198,000 bbl., compared with 112,085,000 bbl. in the 1960 five-month period. Total shipments for the first five months of 1961 are reported at 105,970,000 bbl.; in the same period of 1960 total shipments were 102,549,000 bbl. (Shipment figures do not include finished cement used in the manufacture of prepared masonry cement, as follows: May, 1960—283,000 bbl.; January-May, 1960—976,000 bbl.; May, 1961—282,000 bbl.; January-May, 1961—991,000 bbl.

New Union Contracts Signed By Major Cement Producers

According to the United Cement, Lime and Gypsum Workers International Union, new contracts have been agreed upon with all major companies in the cement industry.

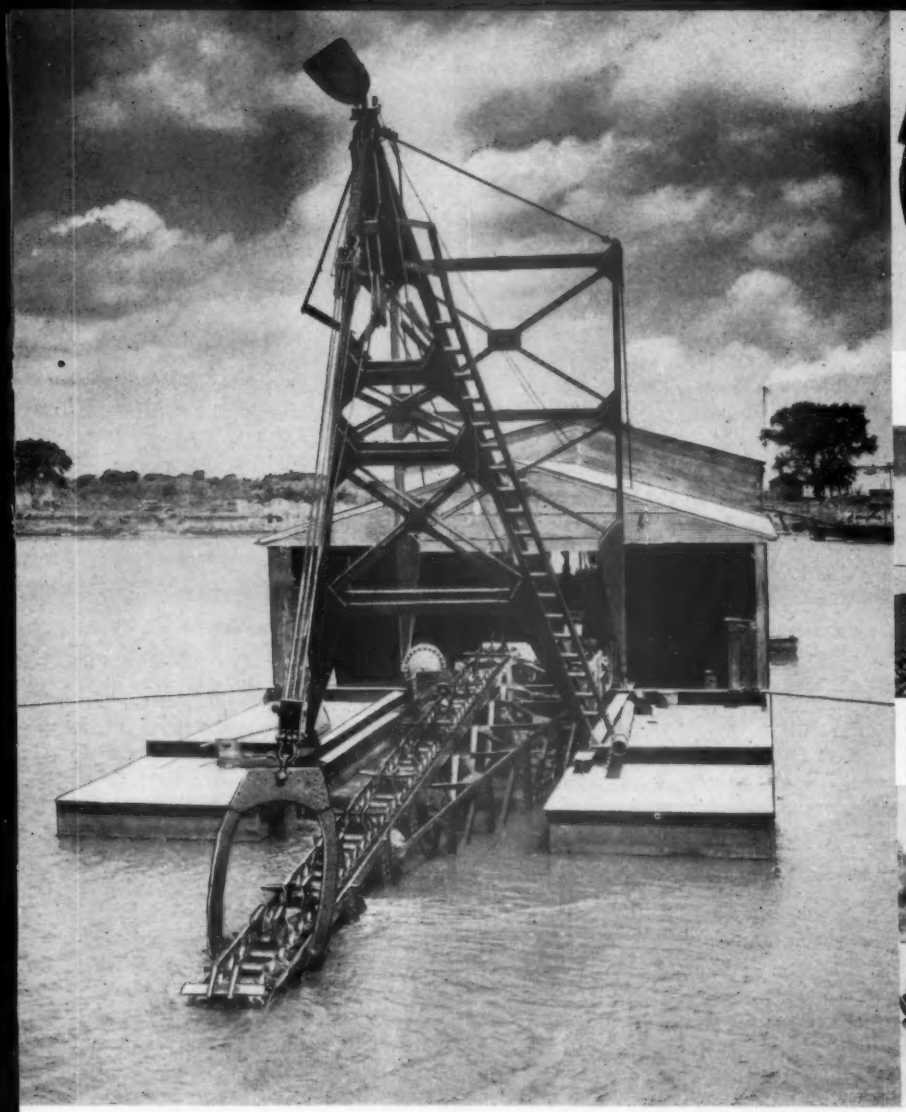
Felix C. Jones, president of the union, stated that the two-year agreements represent "a major break-through in wages and fringe benefits for organized cement workers." The contracts, signed with 25 major cement concerns and several single-plant firms, cover approximately 27,000 production and maintenance workers in 135 plants.

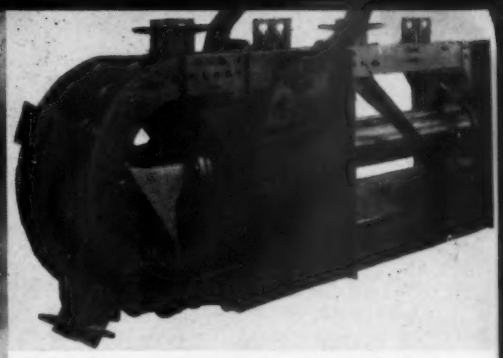
Under the new agreements wage increases of 14 cents an hour (6 cents the first year and 8 cents the second) are provided. Prior to the new agreements wages were at the average rate of $2.58 per hour. Union shop conditions were granted by all major cement companies.

In addition, cement makers agreed to use the union's label on packages containing their products. Both the union and managements of the firms consented to co-operate in setting up a co-operative wage study plan by the end of 1962.

Fringe benefits include the following: all health and welfare costs of the workers paid by the employer; sick and accident benefits upped $5 a week (to $55); 10 cents and 15 cents per hour differentials for second and third shift work; jury duty makeup pay; eighth paid holiday; time and one-half for Sunday work; a clause to protect workers against the effects of automation; and other minor contract changes.

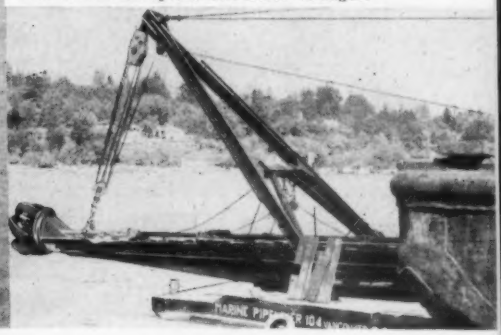
The old contracts had expired on May 1, and the current agreements were reached after about 2½ months of intensive collective bargaining.





Cutter bars on the traveling chain of the "Swintek" actually carry nozzle clogging oversize material up the ladder and dump them away from the suction zone.

Eagle Revolving Cutter Head Dredging Ladders recommended for dredging in hard or sticky material which does not cave or disintegrate freely. Ask for Bulletin 156. Eagle also builds complete All-Steel dredges.



users report

BIG INCREASE

in production with an Eagle "Swintek" Dredging Ladder!

A New Jersey operator even reported as much as 400% increase in output—A Kansas producer with three "Swintek" equipped dredges as much as 300%. No producer that has installed an Eagle "Swintek" ever failed to achieve a worthwhile increase in production—much more than enough to justify the cost. The traveling chain of the "Swintek" screens the intake nozzle keeping out boulders and logs—eliminates shut-downs because of clogged lines—protects pump. Cutter bars on the traveling chain agitate the deposit greatly increasing intake of solids—also cut through stratas of clay that ordinary suction cannot penetrate—promotes continual bank caving, relieving dangerous problem of deep under cutting. A size and type for every condition—river or pond dredging. When your pit gets below the water table and you convert to pumping keep the "Swintek" in mind. *Send for Catalog 83.*

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ENGINEERS • MANUFACTURERS

133 Holcomb Ave., Des Moines, Iowa

Millionth Barrel of Cement Arrives at Glen Canyon Via 188-Mile Truck Haul

On a sizzling hot day in July, George Spickerman, a truck driver, left the Phoenix Cement Company's Clarkdale, Ariz., plant with a load of cement bound for Glen Canyon Dam, just as he had done hundreds of times before.

Six hours later he rolled across the high suspension bridge over the Colorado River and up to the cement-storage silos on the project, located near the Utah-Arizona border.

His arrival was a bit different this time, however. He was greeted by L. F. Wylie, project construction engineer for the Bureau of Reclamation, who presented him with a large photographic mural depicting the big dam project. The occasion: somewhere in the truck-trailer load was the millionth barrel of cement to be delivered to Glen Canyon Dam!

George Spickerman (right) surveys the picture of Glen Canyon Dam presented to him by L. F. Wylie.

Mr. Spickerman's load marked completion of the first one-third of the Phoenix Cement Company's contract. Two million more barrels will be shipped before the dam is completed in 1964. The first load was shipped on February 8, 1960, starting what will probably be the largest and longest cement haul (by truck) in history, totaling approximately 582,800 ton-miles.

The one-way haul from Clarkdale to Glen Canyon Dam is 188 miles. Delivery of the cement is on a subcontract basis with the Belyea Trucking Company of Los Angeles.

Phoenix Cement now has three kilns in operation, the third having gone into operation July 1, 1961.

Construction is under way on two docksite cement storage silos for the Lehigh Portland Cement Company, one in New Haven, Conn., and the other in Providence, R.I. A self-unloading barge has been ordered for transporting cement from the company's Alsen, N.Y., plant to these locations.

During the first six months of 1961, sales of General Portland Cement Company totaled $27,886,700, against $29,240,700 in the first half a year ago. Net earnings after taxes were $4,087,000, (76 cents a share), compared with $4,861,300 (91 cents a share) in the comparable 1960 period.

Lime Sold and Used in April, 1961

Lime sold and used in April, 1961 (987,538 short tons), decreased compared with the previous month, according to reports issued by producers to the U. S. Bureau of Mines.

Increases were reported in agricultural and refractory lime, whereas construction, chemical and other industrial lime decreased. Open-market lime constitutes approximately two-thirds of the total lime reported; the remainder is captive tonnage.

Lime Sold and Used by Producers[1] in the United States, in Specified periods of 1960-61, by Types and Major Uses in Short Tons

	March	April		January-April	
	1961	1961	1960	1961	1960
By types:					
Quicklime	791,744[2]	777,278	799,203	3,005,728[2]	3,211,186
Hydrated lime	209,566	210,260	247,359	781,189	858,648
Total lime	1,001,310[2]	987,538	1,046,562	3,786,917[2]	4,069,834
By uses:					
Agricultural:					
Quicklime	5,390	12,436	11,272	21,432	17,980
Hydrated lime	12,750	12,645	17,341	33,453	35,742
Total lime	18,140	25,081	28,613	54,885	53,722
Construction:					
Quicklime	6,899	6,101	7,027	23,569	26,712
Hydrated lime	80,412	79,188	85,794	279,920	274,143
Total	87,311	85,289	92,821	303,489	300,855
Chemical and other industrial:					
Quicklime	648,304[2]	625,519	595,845	2,457,923[2]	2,301,017
Hydrated lime	116,404	118,427	144,224	467,816	548,763
Total	764,708[2]	743,946	740,069	2,925,739[2]	2,849,780
Refractory (dead-burned dolomite)	131,151	133,222	185,059	502,804	865,477

[1]The monthly canvass excludes the output of plants producing less than 10,000 tons a year. [2]Revised figure.

Doubled Capacity Slated For Huron Portland In $72,000,000 Expansion

According to an announcement released by H. Ripley Schemm, president of the National Gypsum Company's Huron Portland Cement Division, the parent company plans to invest $72,000,000 during the next 14 years in doubling the 12,-000,000-bbl. capacity of the cement operation at Alpena, Mich., now reportedly the world's largest.

At the same time it was announced that Huron's 13th cement distributing plant is to be built at Waukegan, Ill. This facility, which will have a capacity of 150,000 bbl., is expected to be completed this year.

In Alpena, work is nearing completion on a new rotary kiln which will increase the capacity of the mill to 14,000,000 bbl. New crushing and drying facilities will also be installed.

The *Huron*, once an ocean-going oil tanker, will be converted into a dual-purpose cement and coal carrier. With its 55,000-bbl. capacity, the *Huron* will be the largest cement carrier on the Great Lakes.

Flintkote Co. to Make Pipe At $10,000,000 Ohio Plant

Construction will begin this summer on a $10,000,000 asbestos-cement pipe plant for The Flintkote Company in Ravenna, Ohio, 15 miles west of Akron.

This plant is the first of two planned by the company as a result of a licensing agreement with the Johns-Manville Corporation under which Flintkote will make the asbestos-cement pipe long marketed by J-M under the trade name of "Transite."

May Building Awards Show 1st Gain in Homes In 17 Month Period

During May, substantial gains in highways, commercial building, electric light and power systems, and apartments sparked a 5 percent rise in total future construction contracts, according to F. W. Dodge Corporation. Contracts totaled $3,-501,318,000.

In evaluation, Dodge economists pointed out that while apartment building contracts continued their strong showing in May (with a 23 percent gain), even more noteworthy was the 4 percent rise in single-family houses. It marked the first time in 17 months that this category exceeded year-earlier levels.

Contracts for residential building amounted to $1,553,499,000 — a gain of 7 percent over the same month last year. The number of dwelling units represented by the total residential contracts was 112,-681—up 5 percent over a year ago.

The seasonally adjusted Dodge Index of construction was 257 in May (1947-49=100), down slightly from April. The Index read 261 in April, 262 in March, and 244 in May, 1960.

A substantial decline in contracts for manufacturing buildings more than offset sharp increases in other non-residential categories. Future heavy engineering contracts rose 9 percent, chiefly to a 25 percent increase in highway contracts, and a 39 percent increase for electric light and power systems.

A summary of the latest figures is given in the table below:

	May, 1961	May, 1960	% Change
Nonresidential bldg.	$ 1,105,306,000	$ 1,109,676,000	....
Residential bldg.	1,553,499,000	1,452,872,000	+ 7%
Heavy engineering	842,513,000	774,175,000	+ 9%
Total construction	$ 3,501,318,000	$ 3,336,723,000	+ 5%
	5 Mo. 1961	5 Mo. 1960	% Change
Nonresidential bldg.	$ 4,779,358,000	$ 4,700,173,000	+ 2%
Residential bldg.	6,207,458,000	6,120,524,000	+ 1%
Heavy engineering	3,652,373,000	3,302,089,000	+11%
Total construction	$14,639,189,000	$14,122,786,000	+ 4%

Interstate Highway System To Be Completed by 1972 Under 1961 Highway Act

American motorists will be able to travel on approximately 3,000 miles of newly-completed roads in the interstate highway system each year for the next ten years, the Better Highways Information Foundation has predicted.

Completion of the 41,000-mile system by 1972 was assured when President Kennedy signed the Highway Act of 1961. The remaining 30,000 miles of the system will be built during the next decade. Nearly 11,000 miles have been completed or incorporated into the system during the first five years of the program. Much of the location, engineering, right-of-way purchase, and other preliminary work has been done on a large portion of the remaining mileage.

Interstate fund allocations will be forthcoming at the rate of $2.4 billion in 1962, and will increase to the maximum of $3 billion each year beginning in 1967. States put up one dollar for every nine dollars of federal funds on the interstate system.

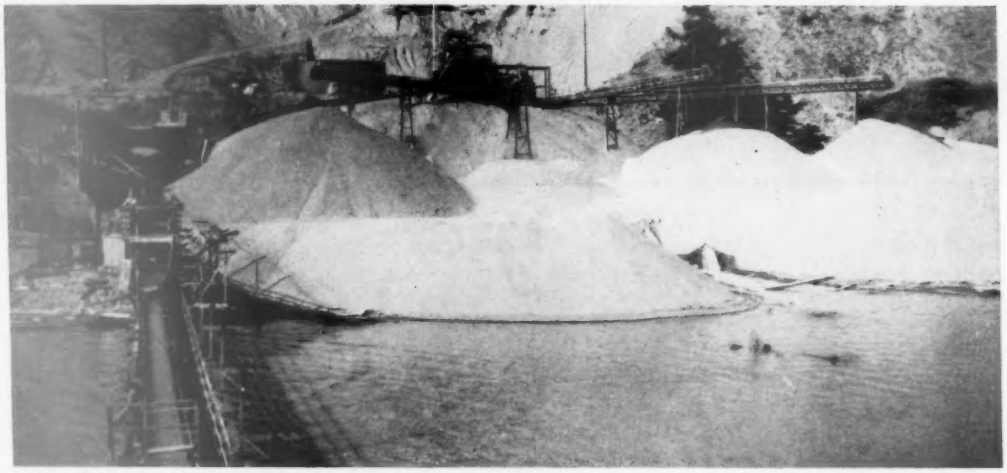
Meanwhile, steady progress in building and improving the Federal-Aid primary and secondary roads is certain, since the new act also provides up to $1 billion annually of federal funds for this program, and this amount is matched by the states.

• Correction

Although a headline in our July issue (page 32) carried the startling news that John H. Mathis was named president of Universal Atlas Cement, this report is in error. Through one of those inexplicable slips, the new president of the *Lone Star Cement Corporation* was erroneously identified with Universal Atlas. We're very sorry!

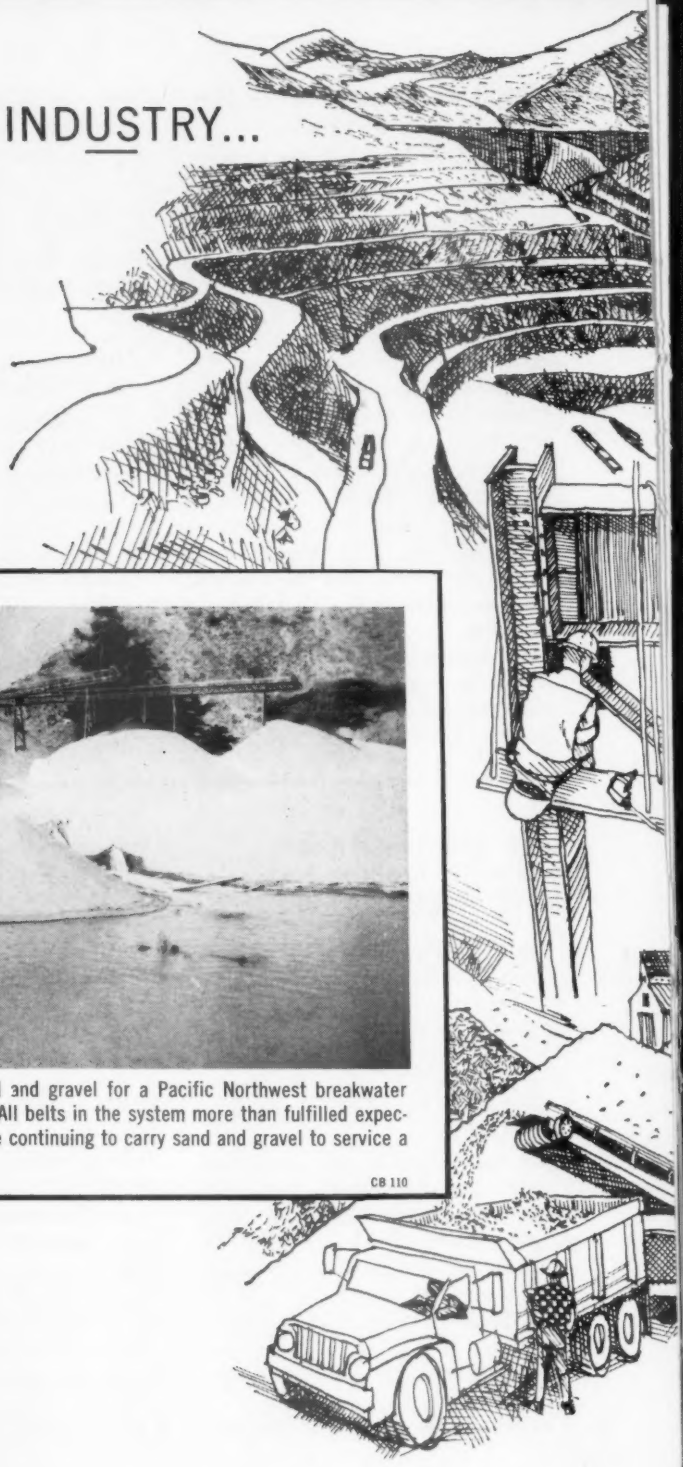
Cement men at the Martha quarry of Marquette Cement Manufacturing Company, located 27 miles from the firm's plant at Nashville, Tenn., have completed 14 years of safe operation. Charles Hughes is plant safety supervisor at Nashville.

AT THE HEART OF INDUSTRY...



Their US-designed Conveyor Belt system made conveying sand and gravel for a Pacific Northwest breakwater possible where handling costs normally would have been prohibitive. All belts in the system more than fulfilled expectations in conveying thousands of tons to complete the breakwater, are continuing to carry sand and gravel to service a 75-mile area.

CB 110



Wherever you see the "hard-hat" of the mining or construction man, you'll find US Industrial Rubber Products helping make jobs easier, faster, more profitable. As the world's largest producer of Industrial Rubber Products, US fills the needs of mining and construction men everywhere.

Where men and hose flex their muscles, you'll find U.S. 4810 Air Hose in the thick of the work. On the really tough jobs—where tight quarters, abrasive terrain and high working pressures take their toll of ordinary air hose—U.S. 4810 stands up to use and abuse. And despite its great strength, this hose is easy to handle, readily flexible, less expensive.

H 120

Moving the oil that moves a nation . . . unwatched and unfailing . . . U. S. Royal V-Belts power well pumps throughout the "oil patch." Working constantly, often unattended for weeks at a time, they retain their exceptional length stability and smooth-running characteristics despite the worst that weather can offer. Such reliability is built into every U. S. Royal V-Belt for every industrial need.

VB 103

New U.S. SlurryKing takes loads up steeper grades, stops avalanching, even carries the fluid portion of slurries along with the solids. This belt lets you drain or retain fluids in slurries by merely changing conveyor and idler roller angles. SlurryKing's tough cover resists the severe abrasion of both wet and dry materials to retain the belt's hill-climbing ability indefinitely.

CB 121

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WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

United States Rubber

MECHANICAL GOODS DIVISION

● This new $300,000 cement distribution and service center was recently placed in operation by Dundee Cement Company at Des Plaines, Ill., a Chicago suburb. Located on a 7½-acre tract, the installation is known as the Northside Station. A companion facility on Chicago's south side, the Southside Station, was built about two years ago.

The company also has distribution centers at Cleveland and Cincinnati, Ohio, and recently announced plans for another in the Pontiac, Mich., area.

Designed by Meissner Engineers, Inc., Chicago, the Northside Station is provided with Fuller-Kinyon and Fuller-Huron systems for handling cement unloaded from hopper cars on either of a set of parallel tracks. As an interesting feature, the interiors of the lower sections of the storage bins shown are fitted with three open 6-in. by 10-ft. Airslides to expedite cement flow to the drawpoints on the conical bottoms. In addition to the installation shown in this photo, there are two smaller loading setups. In one, cement is unloaded from a rail hopper car, the material being transferred directly to bulk truck transports. The other incorporates a single storage tank for truck loading similar to the system illustrated.

Universal Atlas Cement Co. Acquires Ponce Products, Inc.

The Universal Atlas Cement Company, division of United States Steel, recently announced the purchase of Ponce Products, Inc., including Ponce's storage and handling facilities at Port Everglades and the SS *Florida State*, a self-unloading bulk cement carrier, for approximately $4.5 million.

Universal spokesmen said that the firm will buy its cement from Ponce Cement Corporation, which has a plant in Puerto Rico. The cement will be produced in compliance with Universal specifications and will be sold under the "Atlas" brand name.

Biggest Solite Plant in N. Y. To Be Built at Saugerties

Solite lightweight structural aggregate will be produced in the Hudson Valley Lightweight Aggregate Corporation's new plant at Saugerties, N. Y.

This plant will be in production in August, according to George R. Krom, president of the corporation. It will be the largest plant in the New York area producing a lightweight aggregate from slate by a rotary kiln process. Solite has been approved by the City of New York Board of Standards and Appeals, CAL. No. 591-60-SM.

The property on which the plant is built was purchased after months of exploration to find a slate deposit suitable for the production of a quality lightweight aggregate in the New York area.

For the full six months ended May 31, 1961, American-Marietta Company's sales were $157,230,-234, compared with $160,915,599 in the comparable period of 1960. The drop was attributed to unusually adverse weather during the December, January, and February quarter. Net income—$6,310,854 (44 cents per common share)—dropped from $8,961,736 (66 cents on 355,231 fewer shares).

New Canadian Lime Assn. Promotes New Lime Uses, Sets Up Working Goals

Lime is second in tonnage among the chemicals used in the world today, but much more could be used in Canada, according to the Canadian Lime Association.

The Canadian association is interested in developing new uses for lime and in expanding present uses. Meetings have been held in Saskatoon, Toronto, and Ottawa. About a dozen companies, producing about 80 percent of Canada's total tonnage, make up the organization.

Officers include the following: president, E. E. Robertson, Winnipeg Supply & Fuel Co. Ltd., Winnipeg; secretary, T. A. Rourke, Dominion Lime Ltd., St. Bruno, Que.; public relations chairman, George Armstrong, Cobo Minerals Limited, Toronto.

At the Ottawa meeting the aims of the association were discussed with staff members of the Soil Mechanics Section of the Division of Building Research, National Research Council. They were shown the work being done by the section.

Lime stabilization projects which have been carried out successfully by association members were also discussed. The Soil Mechanics Section is also interested in the possibilities of lime stabilization, since this topic is of vital importance to Central Mortgage and Housing Corporation, a government organization.

The possibility of setting up a postgraduate scholarship on freeze-thaw research at a Canadian university has been explored in talks with the staff of the Soil Mechanics Section.

Charter members of the association are Cobo Minerals Ltd., Coboconk, Ont.; Loders Lime (Alberta) Ltd., Calgary, Alta.; Summit Lime Works Ltd., Lethbridge, Alta.; Dominion Lime Limited, St. Bruno, Que.; Winnipeg Supply and Fuel Co. Ltd., Winnipeg, Man.; Aluminum Company of Canada Ltd.; Dominion Lime Ltd., Lime Ridge, Que.; Building Products & Coal Co. Ltd., Winnipeg, Man.; Bonnechere Lime Limited, Carlton Place, Ont.; Shawinigan Chemicals Ltd., Bedford, Que.; Gypsum, Lime and Alabastine Limited, Toronto.

Atlantic Cement Company To Get Huge Rotary Kilns At New Ravena Plant

Two wet-process rotary kilns with the largest producing capacity in the United States, and possibly the world, will be supplied the newly formed Atlantic Cement Company, Inc., by Allis-Chalmers Manufacturing Company. The $64,000,000 plant is scheduled for erection late in 1961 or early in 1962 at Ravena, N. Y.

Each of the two 580-ft. kilns will have a 20-ft. diameter feed end, and each will be capable of producing 5,000,000 bbl. of cement a year. (Their length is surpassed only by the 610-ft. Allis-Chalmers kiln furnished a cement plant last year in Argentina.)

Other equipment for this new plant includes a 57-74 gyratory crusher for primary crushing; three 13- by 36-ft. two-compartment ball mills for cement dry grinding; two 13- by 40-ft. two-compartment ball mills for raw material wet grinding; a trunnion drive arrangement for each grinding mill; three groups of 4.16-kv. metal-clad switchgear for controlling the cement grinding; and slurry mills along with switchgear for the remainder of the plant power distribution system.

The first group of switchgear will control cement mills 1 and 2; the second, cement mill 3 and a future 4; and the third group, slurry mills 1 and 2. Each group starts a drive system consisting of two 1,500-hp. synchronous motors for a 3,300-hp. mill. One circuit breaker starts both motors simultaneously.

The drive will efficiently harness the power of the two synchronous motors located on the mill side of the drive. The electrical load is distributed through an angular rotor shift of one of the motors. Once the load is balanced and the rotor locked in place, no further adjustment is needed.

Cement production at the new plant, which will have dock facilities on the Hudson River capable of accommodating ocean vessels, is expected to start in 1963. The 2,000-acre plant site reportedly has a limestone reserve capable of supplying production for more than 100 years.

Major owners of the Atlantic Cement Co., Inc., are Cerro Corporation, New York, a major producer and fabricator of nonferrous metals, and the Newmont Mining Company, New York.

New Sand-Gravel Operation Opened by A. W. Oakes & Son

A. W. Oakes & Son recently opened a sand-and-gravel pit on Highway 20 near Racine, Wis., to supply their own needs as road builders and asphalt pavers, and the needs of other contractors in the area, as well.

The sand and gravel deposits, formed by old glacial backwash, are reported to be of excellent quality. About 2 ft. of overburden cover the 10-ft. deep sand beds.

To strip overburden and haul sand and gravel to stockpiles, a LeTourneau-Westinghouse D Tournapull with a Hancock elevating scraper is used.

Calaveras Cement Joins P.C.A.—Maintains Own Laboratories

It has been annuonced that Calaveras Cement Company, a division of The Flintkote Company, has become an active member of the Portland Cement Association. Wm. Wallace Mein Jr., stated that the company is budgeting "large sums" for P.C.A. and its work "as a service to the construction industry."

He indicated that in addition Calaveras will continue to maintain its own technically-trained field staff and its own product and research laboratories at San Andreas, Calif.

L'Office Cherifien des Phosphates (OCP), a Moroccan government-owned agency, has engaged Dorr-Oliver Incorporated of Stamford, Conn., to study the feasibility of a new phosphate rock drying process, together with the possible use of nuclear power as a fuel source.

The American Welding Society will move to its new headquarters in the United Engineering Center, a 20-story all-welded building facing the United Nations Plaza, early in September.

Major Smithwick Interest Sold to New Oregon Firm—Ore-Lite Industries, Inc.

Sale of the controlling interest in Smithwick Concrete Products, Portland, Oreg., to a newly formed concern, Ore-Lite Industries, Inc., has been announced by S. Carl Smithwick, president of the former company.

The transaction included the headquarters of the company and the block plant in Portland, the lightweight Haydite expanded-shale producing plant near Vernonia, Oreg., and a block plant in Eugene, Oreg. The Haydite operation was launched in 1950, when this material replaced pumice in the block manufacturing plants.

Mr. Smithwick, who is retiring from active service, is the founder of the Expanded Shale Institute, and served as its president.

Paul Nutt, who heads Ore-Lite Industries, has been with the Smithwick company since its founding, most recently in the capacity of vice-president and sales manager.

Other principals in the newly incorporated firm are Dwight G. DeHaven, who for the last 7 years has been manager of the Eugene division of Smithwick, and who will become production manager; Orland Kjelgaard, who will be superintendent of the Portland block plant; and Andrew Armour, sales representative in southwestern Oregon.

Fluorspar Output Up Slightly In 4th Quarter of 1960

Finished fluorspar produced from domestic sources totaled 221,000 short tons in 1960, and shipments of 230,000 tons were valued at approximately $10,397,000, according to reports submitted by producers to the U. S. Bureau of Mines. This represents a moderate increase over 1959, when 195,100 tons were produced and 185,100 tons shipped from domestic mines at a value of $8,680,200.

Imports for consumption in 1960 totaled 534,000 tons, a slight decrease from the previous year, when similar imports amounted to 555,700 tons. Industrial usage of fluorspar totaled 649,000 tons in 1960, exceeding the record previously established in 1957.

This conveyor hauls aggregate from storage bins to a ready-mix cement plant at 200 f.p.m., carrying loads of 316 t.p.h. The wire rope conveyor is supported on a prestressed concrete beam 276 ft. long, 8 ft. wide, and 3 ft. deep.

Unusual Conveyor Erected To Solve Transport Problem

Faced by the problem of carrying sand and crushed stone from a quarry to a ready-mix plant across a well-traveled highway, management of C. W. Blakeslee & Sons, Hamden, Conn., found a solution by combining prestressed concrete with wire rope.

A 276-ft. prestressed concrete concrete T-beam was fabricated (in two sections), 8 ft. wide and 3 ft. deep. It was installed on steel posts from the aggregate source to the plant across the highway, rising at a 15-degree angle to a height of 87 ft. A 30-in. wide wire rope conveyor fabricated by Hewitt-Robins was positioned on the beam, to carry sand and gravel at speeds up to 200 f.p.m. The system hauls 316 tons of aggregate per hour, a volume equivalent to the load carried by 40 8-ton trucks.

Idler spacing is 5 ft. for troughing, 15 ft. for returns. The system was designed to handle aggregates ranging from 2 in. to sand. The conveyor is driven by a 40-hp. motor.

Cleveland Loading Station Planned for Diamond Cement

Plans for the construction of a $250,000 bulk-cement loading station in Cleveland, Ohio, have been announced by The Diamond Portland Cement Company, a division of The Flintkote Company.

The dust-free loading station, consisting of three large cement storage bins and a branch office, will facilitate deliveries to customers in northern Ohio.

The new Cleveland station will be supplied from recently expanded modern production facilities located at Middle Branch, about eight miles north of Canton.

Diamond Portland Cement Company merged with The Flintkote Company in 1960. Other Flintkote cement-producing divisions are: Calaveras Cement Company, whose products are sold primarily in northern California and adjacent states; Glens Falls Portland Cement Company, which supplies northern New York state and the New England states; and Kosmos Portland Cement Company, with markets in Kentucky, southern Indiana, and southwestern Ohio.

Penitentiary Farm Land Reclaimed After Mining

Several hundred acres of land on the farms of the South Carolina state penitentiary in Sumter County which were leased some time ago to private contractors for gravel mining now have been reclaimed and made productive.

Under the direction of Guy V. Whetstone, director of the state farms, about 100 acres were sowed to kudzu and coastal bermuda grass. The reclaimed land helps to feed 950 head of cattle.

Rebuilding Plan Considered For Catskill, N. Y., Plant Of N. American Cement

Plans for the complete rebuilding of the North American Cement Corporation's plant at Catskill, N. Y., are under consideration, according to W. A. Wecker, president of Marquette Cement Manufacturing Company, the parent firm.

Capacity at Catskill will be boosted by 50 percent, to 2,500,000 bbl. of cement clinker annually. The new facilities will be a major project in Marquette's $23,500,000 modernization, replacement, and improvement program for this year.

Big Dust Filter Installation Planned by Riverside Cement

Riverside Cement Company, division of American Cement, has ordered a Therm-O Flex high-temperature glass-bag filter-type dust collector for the firms's Oro Grande, Calif., plant.

The filter will clean the kiln gases and utilize more than 240,000 sq. ft. of glass cloth. There will be five buildings of precast concrete construction for housing the bags.

The Therm-O-Flex unit will be built by Western Precipitation Division of Joy Manufacturing Company, specialists in dust control equipment. The Oro Grande Therm-O-Flex is the largest ever planned, and is the ninth such installation made by Western Precipitation for the cement industry.

The latest *Supplement to Minerals of California,* now available, brings up to date the bulletin, *Minerals of California.* Both were compiled by Joseph Murdoch, U.C.L.A., and Robert W. Webb, University of California at Santa Barbara.

Sales of Penn-Dixie Cement Corporation for the first half of 1961 totaled $22,565,999, compared with $23,146,257 in the first six months of 1960. Net profits totaled $1,783,756 (64 cents a share), *versus* $2,290,188 (82 cents a share) for the same period of 1960.

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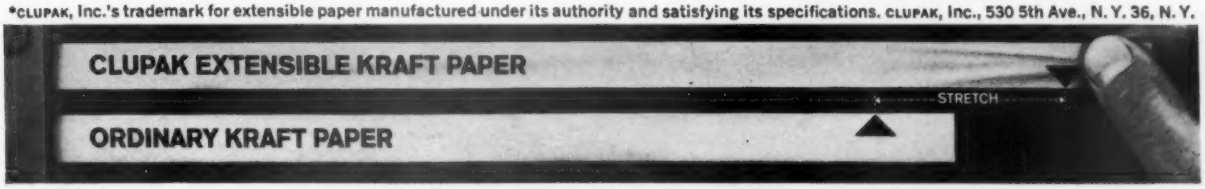

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The photographs at the left illustrate just three examples of the many ways explosives energy is being used more fully, more efficiently. On a section of the Turkey Creek Expressway near Kansas City, the objective was maximum breakage and production on every shot. For this contractor, efficient use of explosives energy meant more thorough and consistent breakage, more payload work out of each piece of his equipment, and minimum downtime from end to end of the job.

In another case, a coal stripper in Ohio developed a way to eliminate almost one-half the total mechanical handling of overburden. He used explosives force to cast much of the overburden directly to the spoil pile, thus eliminating almost half of the mechanical handling previously required.

A quarry operator in Maryland boosted his production and lowered his maintenance downtime by using explosives energy to get more thorough, uniform breakage and excellent displacement for easy digging. The result was better production by both the shovel and the crusher—with reduced maintenance costs as a bonus.

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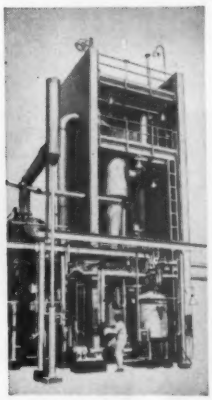


OUR OLD NAME originally referred to explosives when we were incorporated back in 1912. Making explosives was a relatively simple process, once you mastered the fine art of making nitroglycerin.

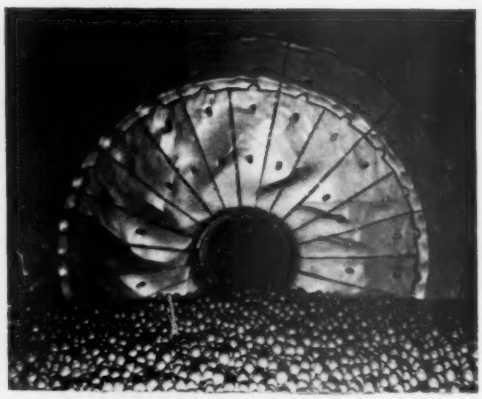
OUR NEW NAME comes from our expansion in the broad chemical field —polyols, emulsifiers, pharmaceuticals, activated carbon, and nitrogen chemicals. Users of explosives will benefit directly from the nitrogen expansion because it makes Atlas basic in ammonium nitrate. Near the Joplin, Missouri, plant of Atlas, the Solar Nitrogen Chemicals, Incorporated, owned equally by Atlas and the Standard Oil Company (Ohio), has completed a $15,000,000 facility, making it one of the nation's primary ammonia producers. High explosives production has also been modernized and facilities concentrated in Missouri and Pennsylvania to give users of explosives high quality products and the most complete line in the industry.

All this is a far cry from the secluded powder mill of the old days. And since our growth has been so much involved in chemicals, we have changed "Powder" to "Chemical" and have gathered all our activities together under "Industries". So, from now on, our official name is Atlas Chemical Industries, Inc. But to users of explosives, Atlas will continue to be in the traditional sense "a powder company." You can still call us "Powdermen" because that's what we are. We welcome the chance to prove this in your operation.

ATLAS CHEMICAL INDUSTRIES, INC.
EXPLOSIVES DIVISION
WILMINGTON 99, DELAWARE

Amsco dippers last longer loading ore cars. Owners of this mine have converted over 90% of their shovels to Amsco dippers like this 6 cu. yd. model because of their toughness and resistance to abrasion. Excellent Amsco service had a part in the decision, too. This shovel loads about 6,300 tons of ore per 8-hour shift.

1000 hours of sand harvesting before major servicing. That's the record of this Amsco 6". It pumps 1,200 gallons of 15% sand solution per minute.



Amsco offers the widest available range of liner designs and special alloys for ball and rod mill liners to suit all conditions of impact and abrasion. Each mill is custom engineered for smooth flowing design and long liner life.

Crusher roll life is increased 5 to 10 times with "Pair for Wear" electrodes—Nicro Mang* for manganese steel welding and X-53 for general hardfacing.

* TRADEMARK REGISTERED

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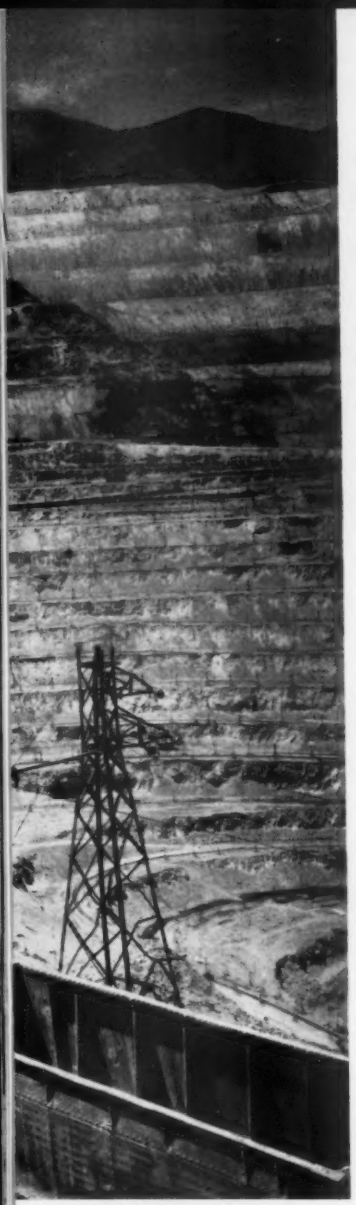

AMSCO WEAR PARTS

help you handle more tons per dollar

Impact and abrasion take their toll of wearing parts and cut deep into your profits. Worn dipper teeth, pumps, crusher rolls, dozer end bits and mill liners can cut *tons* off your production.

Amsco alloy castings include manganese steels, chrome-moly steels, multiple alloy engineering steels and high chromium iron—all developed to meet your specific needs whether it be impact, abrasion, or both. Each type is carefully guarded for proper chemical and physical properties and uniform heat treatment.

If wearing parts on machinery increase costs per ton you'd better investigate Amsco alloy wear parts. Your nearby Amsco representative can analyze your particular application and recommend an Amsco alloy product that will produce or move material at the lowest operating cost per ton. If you don't know his name, write and we'll send you his address.

Try this simple test made on this Massachusetts rock job: Two Amsco Simplex 2-part teeth were installed on the outside corners of a shovel dipper. Competitive 2-part teeth were installed between them. Midway through the test the positions of the teeth were changed. Simplex 2-part teeth showed ***less than half the wear of competitive teeth.*** Tips stay sharp and can be reversed in minutes.

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They're backed by experience...

AMSCO

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILLINOIS

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Denver • Los Angeles • New Castle, Delaware
Oakland, California • St. Louis
IN CANADA: Joliette Steel and Manitoba Steel Foundry Divisions
IN MEXICO: Amsco Mexicana, S.A.
Welding products distributed in Canada by Canadian Liquid Air Co., Ltd.

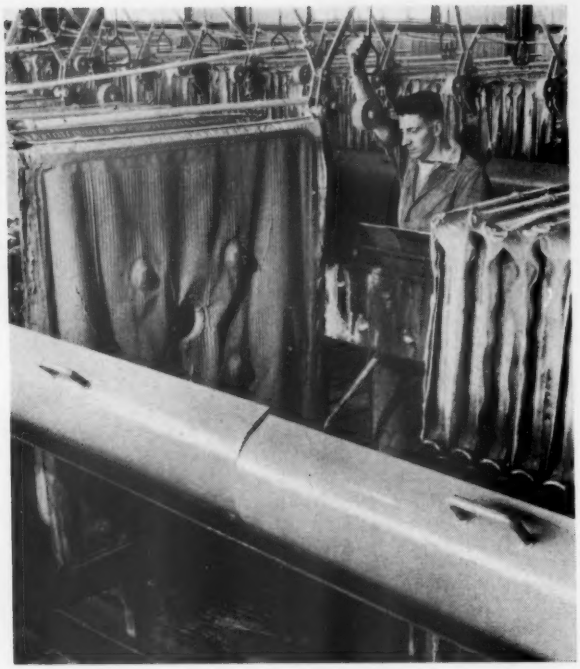
Design of British Filtration Unit Proves Its Worth in Operation

ONE of the most progressive cement manufacturers in Europe is the Associated Portland Cement Manufacturers Ltd. of London. In 1955 the research team of this firm was put to work to investigate the possibility of using a semi-dry slurry and a filter press. This equipment was considered more economical than evaporation of water in wet-process kilns.

Today, a filtration plant claimed to be unique is in successful operation at the Shoreham Works, near Brighton, England. After 18 months of research and experiment, three plate and frame presses were built to the cement company's design by Messrs. W. Boulton, engineers. Operational experience has confirmed that better moisture extraction from the cement slurry, down to about 18½ percent, more than outweighs the fact that the use of plate and frame presses is an intermittent process, and not continuous. Figures achieved—between 18 percent and 19 percent—compare favorably with 22 percent, generally achieved with rotary vacuum filters in American cement plants.

Each press consists of a cast-iron frame holding 48-in. 80-leaf presses, operating at a filter pressure of 120 p.s.i. Each press is dropped 17 or 18 times during each 24-hour period, depositing about 10 tons of cake each time. This gives a capacity of 3,000 to 4,000 tons a week. The filter cloths are made of nylon cloth with a backing of p.v.c.

After various experiments, it was found that the most satisfactory results were achieved with a 12-oz./sq. yd. continuous filament plain weave nylon fabric. Although the initial cost is high, this fabric has a very long life as a result of nylon's great tensile strength, outstanding abrasion resistance, and immunity to rotting; and it is therefore most economical in use. The filter cloths are reinforced with p.v.c. at the



In the slurry filter presses at the Shoreham Works in England nylon cloth is used.

This belt conveyor under the filter press carries off the filter cake.

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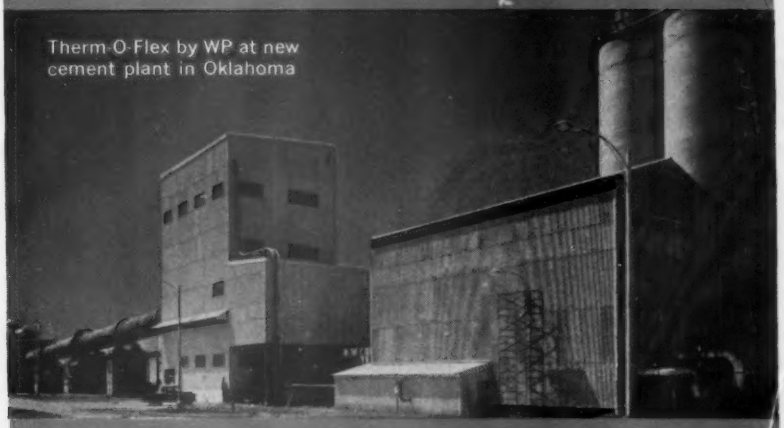

Therm-O-Flex by WP at new cement plant in Oklahoma

Cement makers in Tulsa... and in Tennessee...agree:

Multiclone-Precipitator team (by WP) at Kingsport plant

When DUST is your problem— CLEAR IT WITH WP *

For an efficient, economical solution to any dust control problem—look to Western Precipitation. WP is uniquely fitted to handle your unique problem—being the one organization that custom designs, engineers and installs ALL types of dust and fume control equipment: Precipitator, Mechanical, Jet-Cleaned Filter, Hi-Temp Filter, Scrubbers and engineered combinations.

With no axes to grind for any one system, WP engineers will give your job a completely unbiased recommendation—whether it's a quote on your specifications, a single component, or a completely engineered installation . . . small, major, simple, or complex.

An inquiry—on your business letterhead—will bring you literature promptly. Just write Western Precipitation, 1000 W. 9th St., Los Angeles 54, Calif. (In Canada, write 8285 Mountain Sights Ave., Montreal, P.Q.)

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ELECTROSTATIC Precipitators
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also: **HOLO-FLITE** Processors
HI-TURB:ANT Heaters
TURBULEX Processors

point where the cloth meets the four bosses on each plate.

These filters are hosed down in the press room about once a fortnight; and there has been no trouble from blinding.

Records kept during a period of 12 months showed that the average initial life of a nylon cloth was 2,000 pressings. Its total life, after repairs, was 3,000 pressings, and during this time it handled about 375 tons.

One problem which had to be overcome was how to move the heavy presses. This difficulty was solved by designing a semi-automatic system.

A further difficulty might have been that the entire cake would fall onto the conveyor which carries it to storage. To forestall this, two wires were installed under the presses, so that the cake falls onto the wires and breaks into small pieces, which are easily handled by the rubber conveyor belt. (See illustration.)

The filtration unit does not delay production. The fuel saving has been calculated exactly; it is of the order of 25 to 40 percent, depending on the original efficiency of the kiln. The cost of the installation and the extra labor involved in operating the filter presses is offset by this saving. There is greater throughput, and a considerable over-all economy has been effected.

Based on satisfactory experience at Shoreham Works, the company is installing similar filtration plants in other existing plants and new facilities. Designs for larger presses of 24 and about 50 tons of slurry-cake per single pressing have been developed. Practical test with slurries from other plants carried out at Shoreham have been satisfactory.

There is one point, however, which is important. The composition and consistency of the slurry which can be successfully handled on these presses must be kept within certain limits. Very viscous and ultra-colloidal slurries are not economical due to the long filtration time and the costly equipment required.

At the other end of the range are hard granular materials. Due to low plasticity, these materials do not yield a filter-cake which can be transformed into nodules. Filtration times have been worked out for raw materials by trial-and-error methods, preferably with full scale tests.

Pressure used for cake production is another important factor. It has been found that the best pressure is about 120 p.s.i. When this pressure is applied to nylon filter cloths made from 12½-oz. nylon, the solid content (per ton of water) in the filtrate is only about ¼ lb., and moisture is evenly distributed throughout the cake.

Finally, experience has shown that the real filtering medium is the filter cake itself. After a very short period the thin layer of semi-dry slurry thickens on the cloth and becomes the filtering agent. As a matter of fact, the cake is built up from the outside towards its center. The filtering action is thus dependent on several factors; it cannot always be predicted without extensive research and test procedures.

Acknowledgement for data is due to Associated Portland Cement Manufacturers Ltd. The illustrations have been provided by the British Nylon Spinners Ltd. of London. This firm took an active part in research for the most efficient filter cloth.

Iron-Blast-Furnace Slag Production Continues High During 1960

Production figures for processed iron-blast-furnace slag moved upward in 1960. Demand remained high, and efforts to fulfill requirements were met in part by utilizing reserve stocks.

Output of processed iron-blast-furnace slag increased by 429,000 short tons over that of 1959. Value of slag processed reached a total of $48,000,000, compared to $47,000,000 in 1959. Statistics were compiled from a canvass directed by the National Slag Association in co-operation with the U. S. Bureau of Mines. Production figures were reported by 39 slag-processing companies who operated 62 air-cooled-slag, 17 granulated-slag, and 23 expanded-slag plants.

Production of screened air-cooled slag remained about the same as in 1959; nearly 22 million short tons. Of this total, 20 million short tons (91 percent) was used as aggregate in portland cement concrete construction, bituminous construction of various types, highway and airport construction, and railroad ballast.

Other important uses for this commodity were for concrete block manufacturing, mineral wool, built-up roofing aggregate, sewage trickling filter medium, and soil beneficiation. The amount used for portland cement concrete construction, highway and airport construction, roofing, and agricultural liming increased over the previous year, but slight seasonal declines were noted in the quantity utilized for bituminous construction, mineral wool, and railroad ballast.

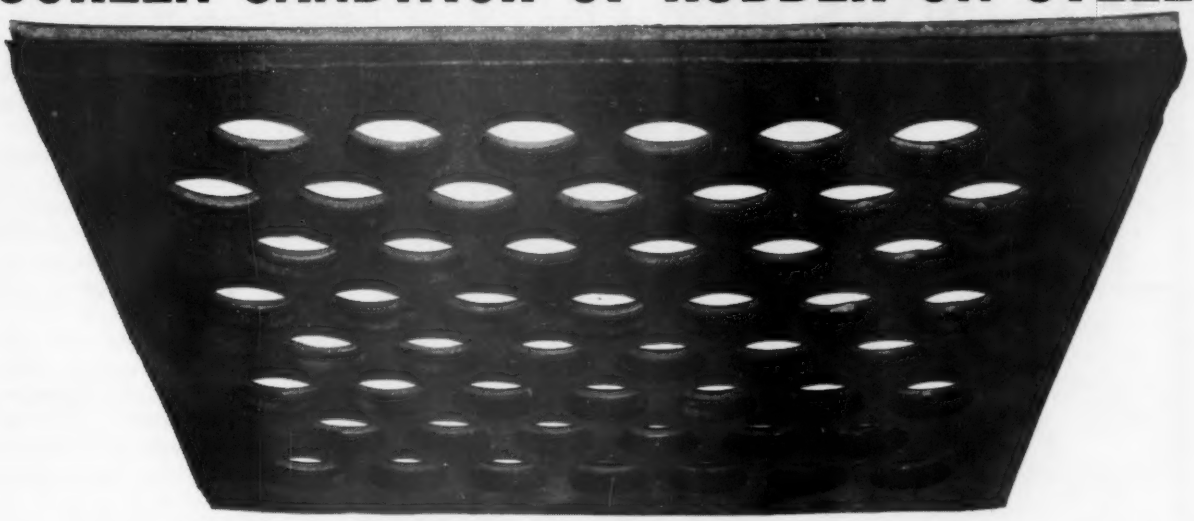
Tabulated unscreened air-cooled slag production totaled more than 1 million tons; both tonnage and value were greater than in 1959. In addition to tonnage reported in the tables, 2,048,000 tons of slag was processed in Utah and used as special road fill material.

Granulated-slag production totaled 3,000,000 tons, an increase of 12 percent, compared with 1959. Use in the manufacture of hydraulic cement accounted for 50 percent of production; 35 percent was used in road construction, and the remainder for aggregate in concrete block manufacturing, soil conditioning, and miscellaneous uses.

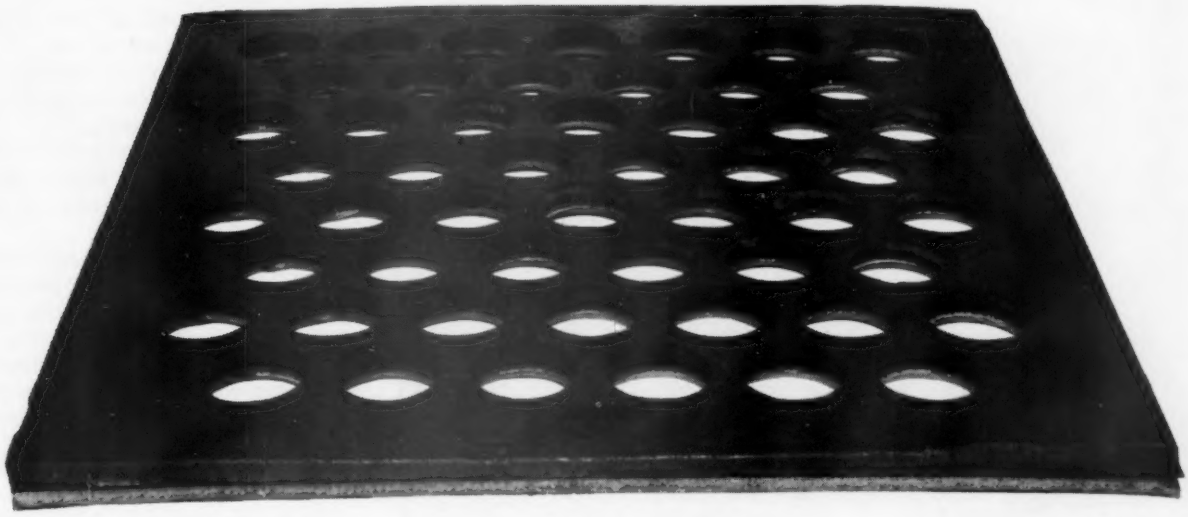
Expanded-slag production totaled 2,600,000 tons, valued at slightly less than $8 million; there was a decline of 7 percent in volume and 3 percent in value. Ninety-eight percent of expanded-slag production was used in the manufacture of lightweight concrete block.

A 5½-acre tract has been purchased by the Universal Atlas Cement Division, U. S. Steel Corporation, at Sewell's Point, Norfolk, Va. This site will be used for a cement distribution station.

SCREEN SANDWICH OF RUBBER ON STEEL



TAKES THE BITE OUT OF ABRASION COSTS



A specially designed rubber covering protects Hendrick Perforated Metal Screens by absorbing the abrasive action of ore, coal and stone. As a result Hendrick rubber-clad metal resists plate wear under extreme screening conditions. Rubber lasts longer because it is vulcanized under controlled heat and laminated to the steel by a new adhesive.

For more information about this unusual product, we invite you to contact your local Hendrick representative (he's listed in your Classified Telephone Directory under METALS, PERFORATED) or mail in the coupon.

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Heavy-duty equipment for:
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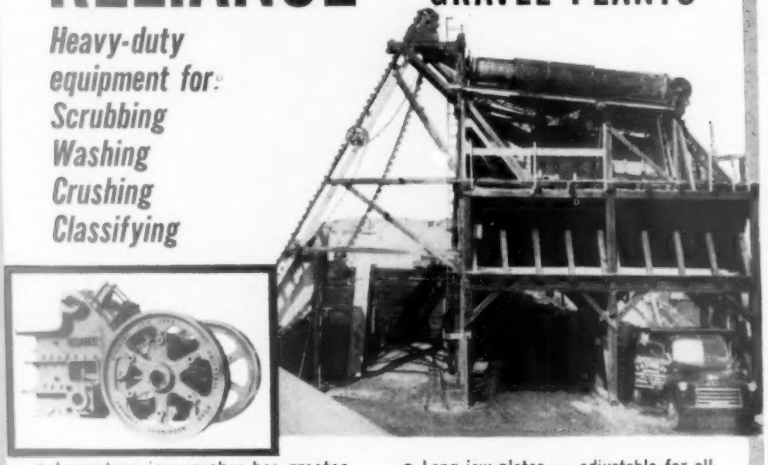

- Lever-type jaw crusher has greater weight, more stability — saves you money on upkeep.
- Minimum abrasion — outlasts other designs 3 and 4 to 1.
- Long jaw plates — adjustable for all fineness ranges.
- Plants of 50 to 1,500 tons-per-day capacity, engineered to your needs. Backed by half century experience.

Booklet on request, pictures installations

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Main office and factory: Kingston, N. Y.
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HERE WE GO!
WAGON TRAIN
MORE TONS PER TRIP
A CONVENIENT WAY TO
UNLOAD — SIDE DELIVERY →
KEEP GOING. LEAVE
ROAD CLEAR FOR NEXT
WAGON TRAIN

DIFFERENTIAL COMPANY
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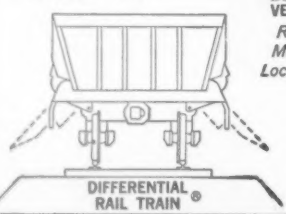

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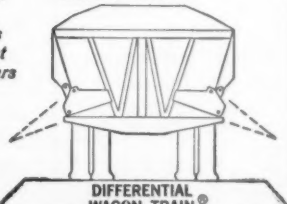

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New Vermiculite Policy Adopted by Vermiculite Inst.

Members of the Vermiculite Institute, Chicago, Ill., have adopted a new policy that will assure high quality in vermiculite concrete roof installations throughout the United States.

Edward R. Murphy, managing director of the institute, has announced that member companies are now contracting with approved roof deck appliers to assume responsibility for the quality of finished vermiculite decks, and to install them in strict accordance with institute specifications. Annual certificates will be issued to such appliers, and they will be listed in a roster for architects, engineers, general contractors, and built-up roofing companies.

Four Killed in Explosion At Lehigh's Mitchell Plant

A blast believed to have been caused by ignition of an accumulation of natural gas demolished a new scale house at the Lehigh Portland Cement Company's Mitchell, Ind., plant on June 21, killing four workers. More than a dozen other workers were injured, some critically.

Work on the construction of the scale house was in the last stages, and three of the four persons killed were construction workers.

If the explosion had not occurred during the noon hour, it is believed that many others would have been injured.

Marquette Cement Manufacturing Company management reported receipts amounting to $33,933,454 for the first six months of 1961, against $23,000,976 for the same period last year. Net income was $3,877,-555 ($1.13 per common share). In 1960 the firm's six-months earnings were $3,431,593 ($1.27 per share).

For the first six months of the calendar year Lehigh Portland Cement Company sales totaled $35,-269,839, against $42,401,851 in the comparable period of 1960. Earnings for the January-June period were $806,243, against $3,-031,673 last year. The drop was attributed to the general business slow-down.

British Quarrying Institute Moves to New Headquarters

Offices of the *Quarry Managers' Journal* and *Cement, Lime and Gravel* have been moved to 62-64 Baker Street, London, W. 1, England, a move which coincided with other changes. Brian G. Fish, appointed editor earlier this year, is also now technical officer for the Institute of Quarrying, located at the same address. Hugh O'Neill, A.M.I.Q., is assistant technical editor for both journals.

Mr. Fish edits technical material for the *Journal,* supervises and directs short courses on quarry practice and similar activities, and investigates textbooks and other aids for those preparing for technical examinations.

The Institute is concerned with the establishment of proper technical qualifications for quarry management, and has its own association membership examination system. It has also co-operated with other interested groups in drawing up a syllabus for sand, gravel, and quarrying certificates under the sponsorship of the City and Guilds of London Institute.

Quarry Managers' Journal is the official journal of the Institute and also the organ of several trade associations. It is the only publication devoted solely to the quarrying industry. Bernard Hill, B. A., is assistant editor.

Cement, Lime and Gravel is the official organ of trade associatons in these fields. Christopher Birch is assistant editor.

British Columbia Cement Co. Donates 70-Acre Park Site

Bamberton Park, British Columbia's newest summer playground, developed on a 70-acre waterfront site donated by the British Columbia Cement Company, Ltd., was officially opened on June 24.

The area straddles a ridge overlooking the only sandy beach on the southern east coast of Vancouver Island.

Fifty camp units, managed by a resident superintendent, are located in the woods overlooking the beach. Parking facilities, picnic grounds, and other recreational facilities have also been provided.

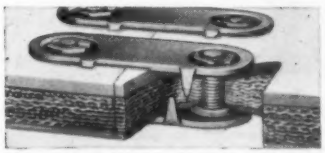
SIMPLIFY YOUR BUCKET ELEVATOR SPLICING WITH . . .

FLEXCO® BELT FASTENERS

Installation at Ready Mixed Concrete Co., 908 West 25th Street, Kansas City, Missouri.

PERFORMANCE YOU CAN DEPEND ON: The bucket elevator belt shown above, furnished by Republic Rubber Co. of Ohio, was installed in March, 1959 to replace a belt on which there were 9 repair lap joints. The FLEXCO splice pictured is the original installation. Only a negligible amount of take-up has been required since it was put in service. Belt has handled approximately 150,000-200,000 tons of sand and concrete stone.

PROTECT YOUR INVESTMENT IN CONVEYOR BELTS WITH FLEXCO . . . the quality fastener for all heavy-duty conveyor belt applications: SAND & GRAVEL, CRUSHED ROCK, CONSTRUCTION EQUIPMENT, COAL & METALS, ETC.



Cutaway of a FLEXCO application showing the compression plates, teeth and precision-made bolts and nuts.

Available in Steel, Monel, Stainless, Everdur. Also promal top plates.

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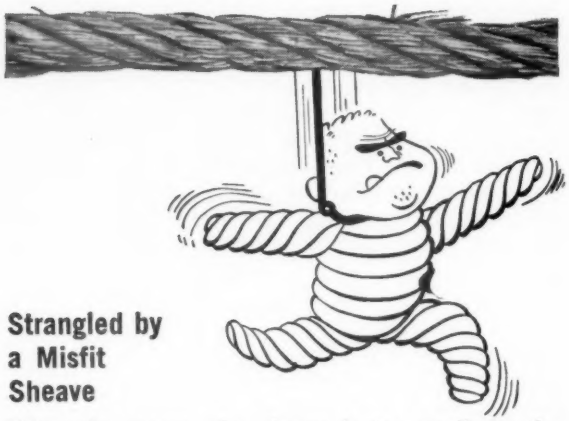
Union Wire Rope

In Union, There Is Quality That Responds

Overloaded—Soon Exploded

The rated capacity of a wire rope is based on the breaking strength (catalog) divided by a safety factor applicable to the type of service or use. The grade of steel, type of construction and size of the rope determine tensile strength. It must be properly related to the loads it will carry, or costly and dangerous early failures are likely to occur.



Strangled by a Misfit Sheave

When the groove of a sheave is too small for the rope diameter, pinching action quickly destroys the rope—especially when it's overloaded. The victim shown here was knocked out in just 1½ hours of service.

UNION Wire Rope Tuffys—Famed For Tough Job Performance

Tuffy Scraper Rope

Flexible enough to take sharp bends; stiff enough to resist looping and kinking when slack; highly resistant to the shock of load impact — that's Tuffy balanced construction. Mount a reel on your scraper—save wasting sound rope.

Tuffy Slings and Hoist Lines

Slings are a patented, 9-part machine-braided wire fabric that is next to impossible to knot or kink. Hoist lines have built-in strength, toughness, flexibility. Balanced—a top-performing team for handling every type of material. In addition to Tuffy, Union Wire Rope furnishes a complete line of slings.

Tuffy Dozer Rope

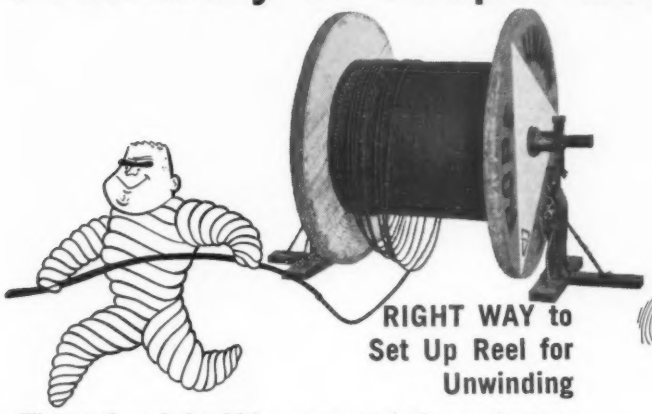
Mounts right on your dozer in a 150′ reel. When rope shows wear, just feed through enough to replace the damaged part. Saves rope, gives you a bonus of extra service. Also available in 300′ and 500′ reels.

Union Knows the Ropes—Comes Up With Solutions To Wire Rope Problems And we have 'em—more than 1600 standard constructions. Add to that the famous Tuffy family of special ropes and slings, custom-made for special needs and special uses. If none of these fit your needs, our research laboratory engineers and field staff are at your service. They'll build you just the rope or sling you need—with Union toughness and Union quality all the way. Ask your Union distributor—listed in the phone book Yellow Pages.

Tuffy Tips

New steels are born at Armco

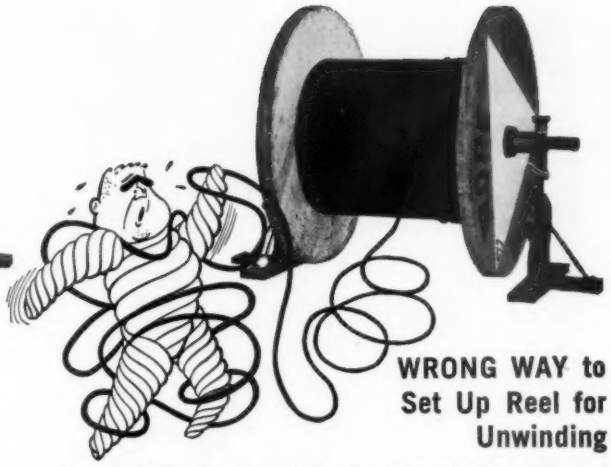
Profitably To Proper Use



RIGHT WAY to Set Up Reel for Unwinding

The stock reel should be set up on jacks, so the rope will come from the under side of the reel.

In the picture (above), unwinding has started and the reel is turning faster than the rope is being pulled off. But no damage is done. Why? Because in coming from the under side of the reel, the rope is simply loosening, without forming loops or kinks.



WRONG WAY to Set Up Reel for Unwinding

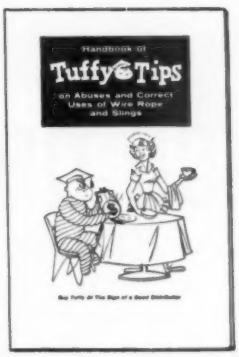
The rope is coming from the top of the reel and forming loops as it overruns. These loops are likely to form kinks and dog legs, which can be ruinous to rope life.

Tuffy Dragline Rope

High abrasive resistance and super flexibility. Gives long service, dependable action in handling any material—wet or dry dirt, sand, gravel, rock, minerals. Rides smoothly on grooves—hugs the drum when casting for full load.

Union Wire Rope Handbook of TUFFY TIPS... Free!

The "Tuffy Tips" shown here are quoted right out of Union's handbook. In it there are dozens of other priceless hints on the correct use of wire rope. The common abuses and how to avoid them. How to save costly injuries. Maintenance tips. The proper fittings and how to apply them. Recommended sizes. Many other facts and suggestions that will cut down your rope costs and help you get out of wire rope the full service we build into it. No charge. Write Union Wire Rope, Armco Steel Corporation, 2132 Manchester Ave., Kansas City 26, Missouri.



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ARMCO Union Wire Rope

Shock-Fortified Firestones

ADD TIRE POWER TO TASK FORCES!

You'll beat downtime and add to profits when your quarry trucks roll on Firestone SUPER ROCK GRIP DEEP TREAD tires. Shock-Fortified nylon cord bodies armor these rugged tires against haul impact to keep your quarry equipment working. Extra cut-resistance is built into Firestone quarry tires, too, with long-wearing Firestone Rubber-X. This exclusive cord-body and rubber combination gives your quarry trucks new staying power under big loads, in the roughest conditions. Put Firestone tires on your quarry equipment—and get the backing of fast, on-the-job service—from your nearby Firestone Dealer or Store.

Always Specify Firestone Tires When Ordering New Equipment.

Firestone

FIRST IN OFF-THE-HIGHWAY TIRE NEEDS

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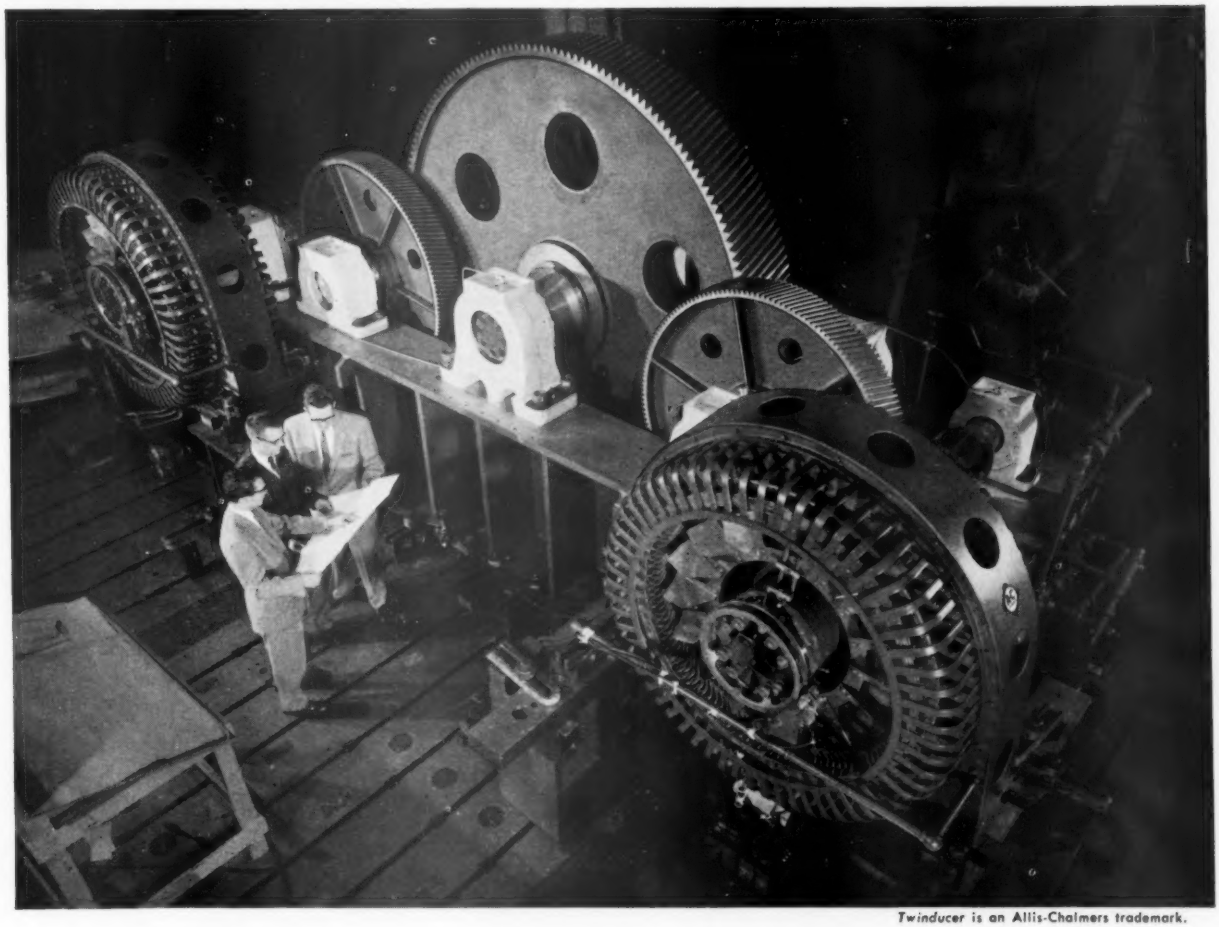
ALLIS-CHALMERS



Twinducer is an Allis-Chalmers trademark.

Full-load demonstration proves 98%-plus efficiency of Twinducer grinding mill drive

New, twin-motor drive system divides mill load electrically, saves space and installation costs, extends gear-train life.

To show the high efficiency of the *Twinducer* drive, Allis-Chalmers engineers recently conducted a series of full-load demonstrations at the factory.

Full load was simulated by coupling two *Twinducer* drives. Driver unit was coupled to driven unit. Load on driven unit was two equally loaded generators.

Power input to the motors was measured, and compared with the output of the generators. Efficiencies (exclusive of ordinary motor and generator power losses) were found to range from 98.48% to 98.52% . . . more than twice the efficiency of most conventional mill drives.

The *Twinducer* drive balances the load electrically, through a unique, angular rotor shift of one motor. Result is a drive arrangement that takes less space than other trunnion drives . . . and facilitates automation of grinding equipment. *Twinducer* drive cuts maintenance costs, conserves power requirements and greatly extends gear-train life.

For complete information on the new *Twinducer* drive system, see your A-C representative. Or write **Allis-Chalmers,** Industrial Equipment Division, Milwaukee 1, Wis.

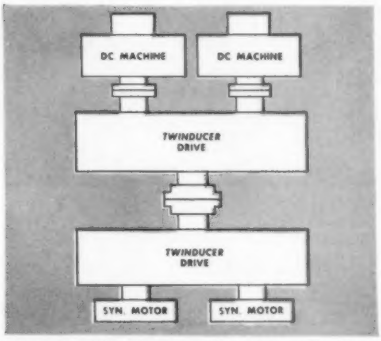
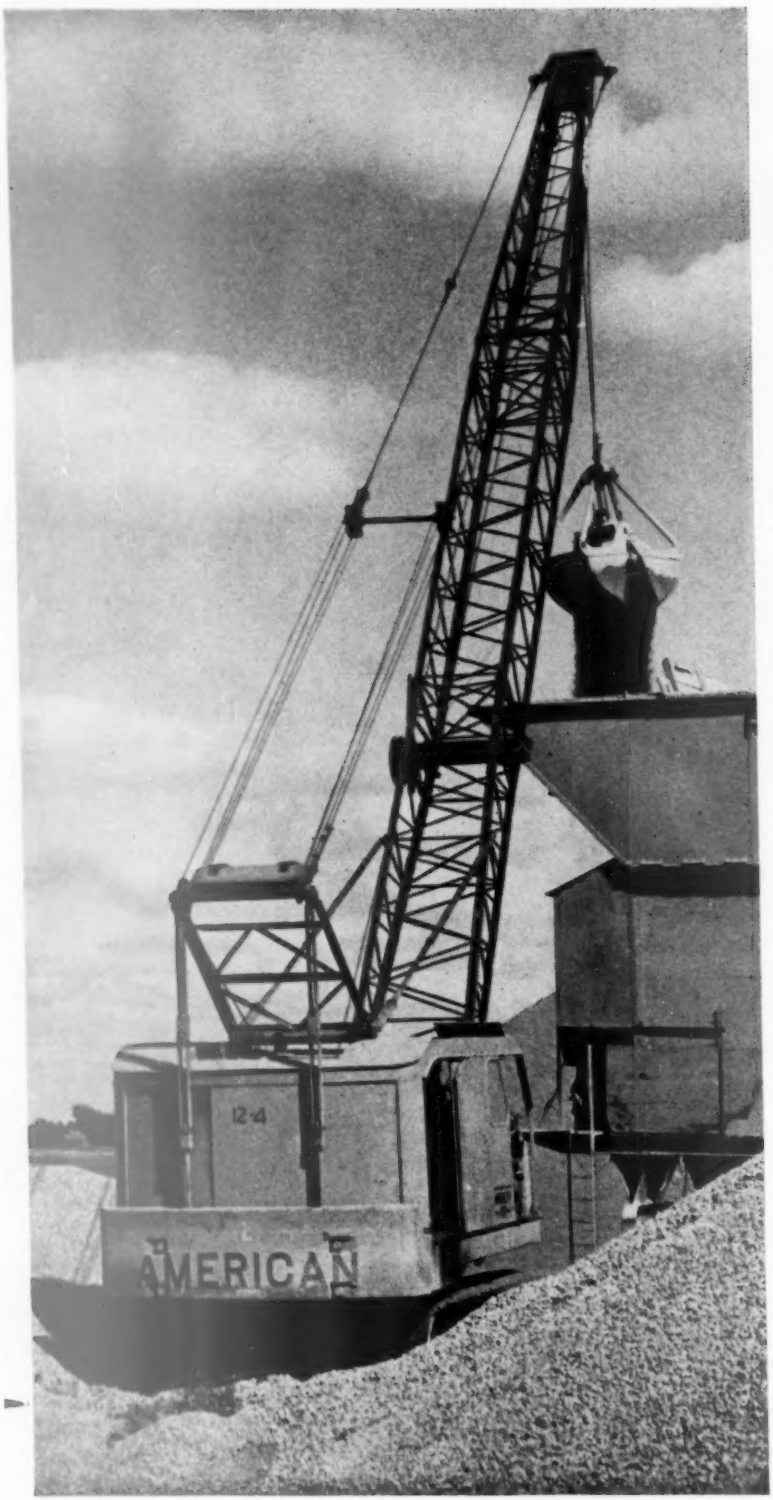


Diagram of **Twinducer** drive demonstration. **Load is balanced electrically by a rotor shift mechanism in one of the twin synchronous drive motors.** A-1514



look for these long-range values in your next crane/excavator

You've heard it said that all makes of cranes and excavators perform pretty much alike. In some respects this may be true . . . if you're talking about new machines. But after a few hard years on the stockpile — or loading in the pit — the *real* differences begin to show up! And here's where AMERICAN's modern engineering and rugged construction pay off. Examples . . .

On your AMERICAN, you have antifriction bearings at *all* vital points, right on down to the brake linkages. That's one reason for AMERICAN's fast response — year after year — without need for frequent take-up or rebushing. Free-rolling load and hook rollers are tapered to eliminate scuffing action that causes wear and requires adjustment.

AMERICAN's heavy-duty clutches engage smoothly without grip or fade, give you plenty of cool-running contact area for continuous duty-cycle operations. These clutches are easy to adjust.

Rugged machinery deck is all-welded and jig-bored . . . for perfect shaft alignment from the first day on. Travel machinery is the huskiest in the industry.

It's details like these — and many more like them — that enable AMERICAN to cut your pit costs over the long pull. Talk it over with your AMERICAN distributor . . . today. CC-737

SHOVELS ½ TO 4½ YDS
CLAMSHELLS—DRAGLINES

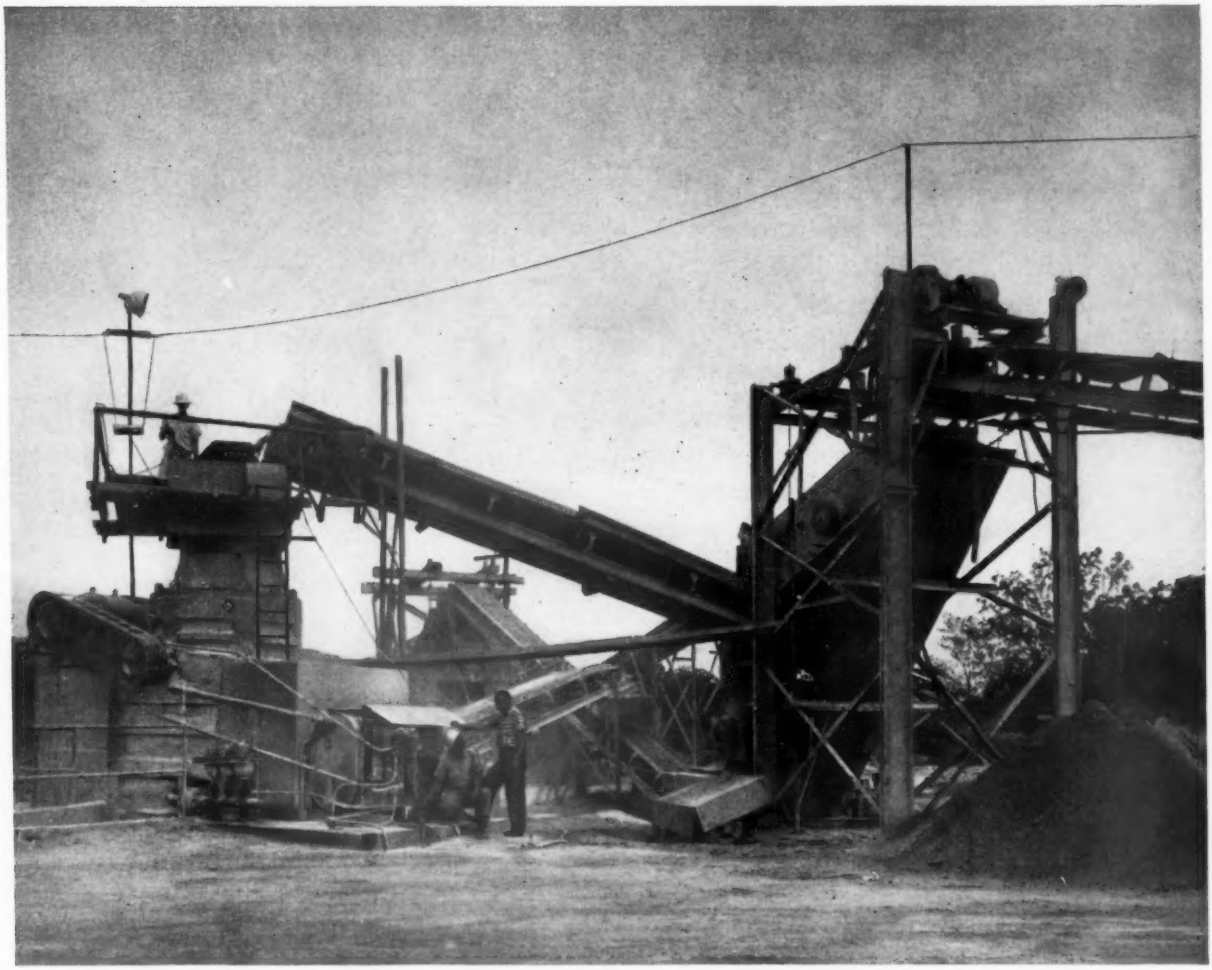
FORGED FITTINGS FOR
WIRE ROPE AND CHAIN
(Crosby-Laughlin Division)

AMERICAN

AMERICAN HOIST
and DERRICK COMPANY
ST. PAUL 7, MINNESOTA

ALLIS-CHALMERS

A-1345



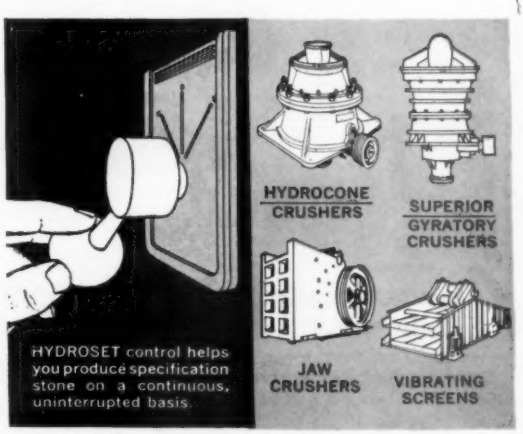
Small switch brings big profits

with Hydroset-controlled crushers paying extra dividends

A shift in the crushed-stone market from 2½" topsize stone to 1" x 0 fines posed a problem for Aggregate Limestone Company, Trussville, Alabama.

To make the switch in production, they installed a 1051 *Hydrocone* crusher as a secondary unit, converted the existing *Hydrocone* secondary to third-stage crushing. This modest investment boosted production 60%, at the same time producing a more salable product.

And Aggregate Limestone Co. won't get caught with the wrong product size again. Their *Hydrocone* crushers are equipped with *Hydroset* control — providing easy adjustment for wear and quick change of product size, as often as necessary and on a minute's notice. Ask your A-C representative about the rugged dependability of *Hydrocone* crushers for reduction — and the product flexibility you get with *Hydroset* control. Or write **Allis-Chalmers,** Industrial Equipment Division, Milwaukee 1, Wisconsin.

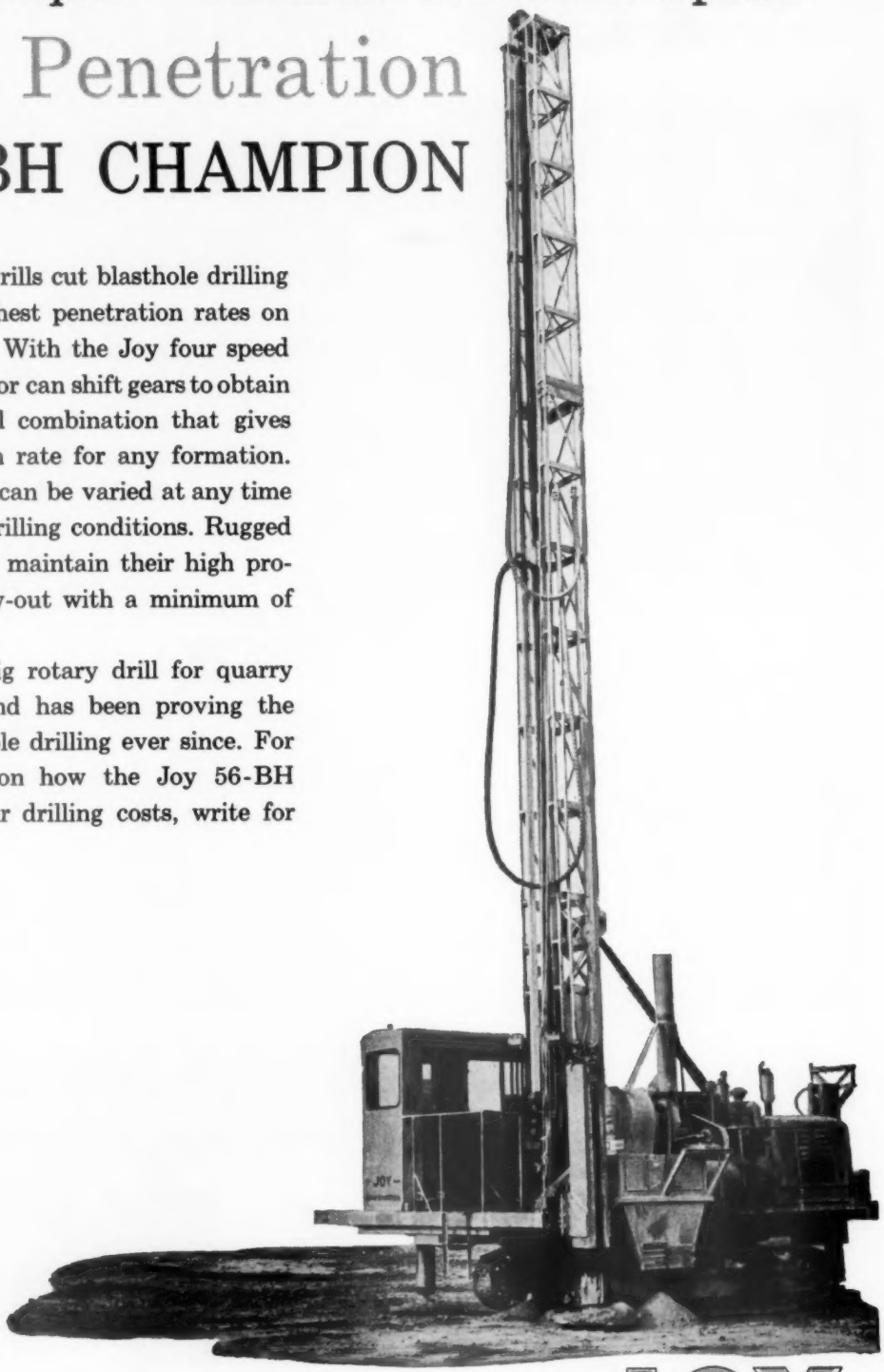

HYDROSET control helps you produce specification stone on a continuous, uninterrupted basis.
HYDROCONE CRUSHERS
SUPERIOR GYRATORY CRUSHERS
JAW CRUSHERS
VIBRATING SCREENS

Variable Torque + Variable Rotation Speed = Fastest Penetration

JOY 56-BH CHAMPION

Joy 56-BH Champion Drills cut blasthole drilling costs by giving the highest penetration rates on blast holes up to 6¾". With the Joy four speed transmission, the operator can shift gears to obtain a torque-rotation speed combination that gives the highest penetration rate for any formation. The torque-speed ratio can be varied at any time to meet a change in drilling conditions. Rugged 56-BH Champions can maintain their high production day-in and day-out with a minimum of maintenance.

Joy pioneered the big rotary drill for quarry operations in 1946, and has been proving the economy of big blasthole drilling ever since. For complete information on how the Joy 56-BH Champion can cut your drilling costs, write for Bulletin 2461-26.



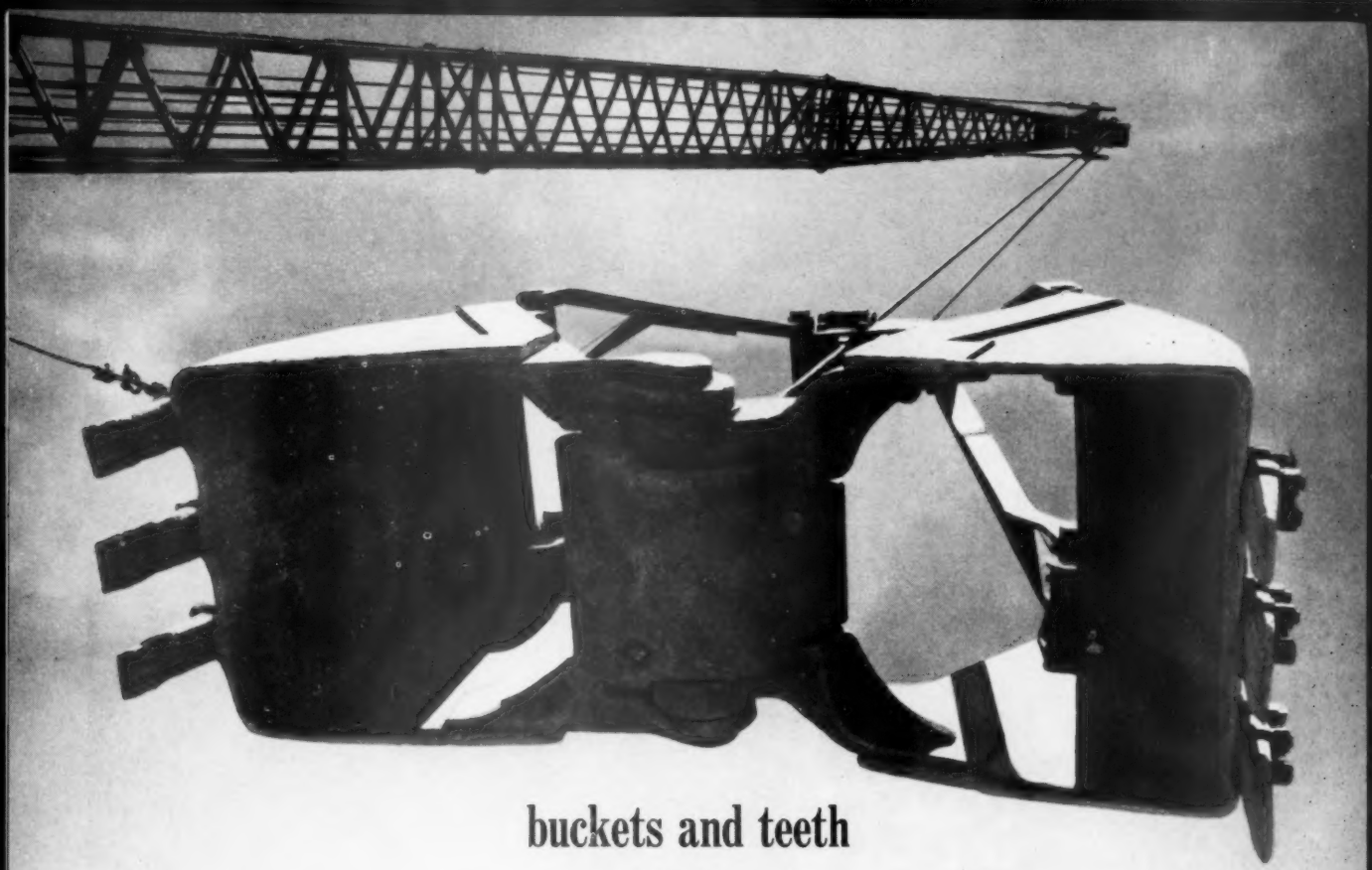
EQUIPMENT FOR QUARRYING . . . FOR ALL INDUSTRY

JOY

Portable Compressors | Trac Drills | Rock Bits | Conveyor Idlers

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario



buckets and teeth
blades
tracks
sprockets
crushers

hardsurface it with an Airco Electrode or Wire – and do the job faster

You put your equipment back into action with confidence when you hardsurface it with an Airco electrode . . . or Airco automatic or semi-automatic wire.

Because the Airco line is *complete* you can always find an Airco electrode or wire designed especially to handle your most specialized job.

Does the job call for uniform hardness over the entire area, plus welder appeal? You'll find the right electrode or wire in the Airco line. Do you need an all position electrode or wire, with outstanding arc stability? You'll find it in the Airco line. Want to make maximum coverage? You get it with the Airco line.

To cut downtime . . . and lengthen the life of your costly equipment...hardsurface it with an Airco electrode or wire.

Special: – Send for a free copy of the new catalog, "Airco Hardfacing Electrodes and Wire." It illustrates 105 hardsurfacing applications, recommends the electrode or wire to use for each, gives characteristics and chemistry, and outlines procedure step by step. Never before has so much know-how been packed into such easy-to-read form.

Call Airco or look in your Classified Telephone Directory under "Welding Equipment and Supplies" for your nearest Authorized Airco Distributor.

Air Reduction Sales Company, 150 E. 42nd St., New York 17, N. Y.

Please send me the new Airco Hardfacing Electrode and Wire catalog.

Name_____

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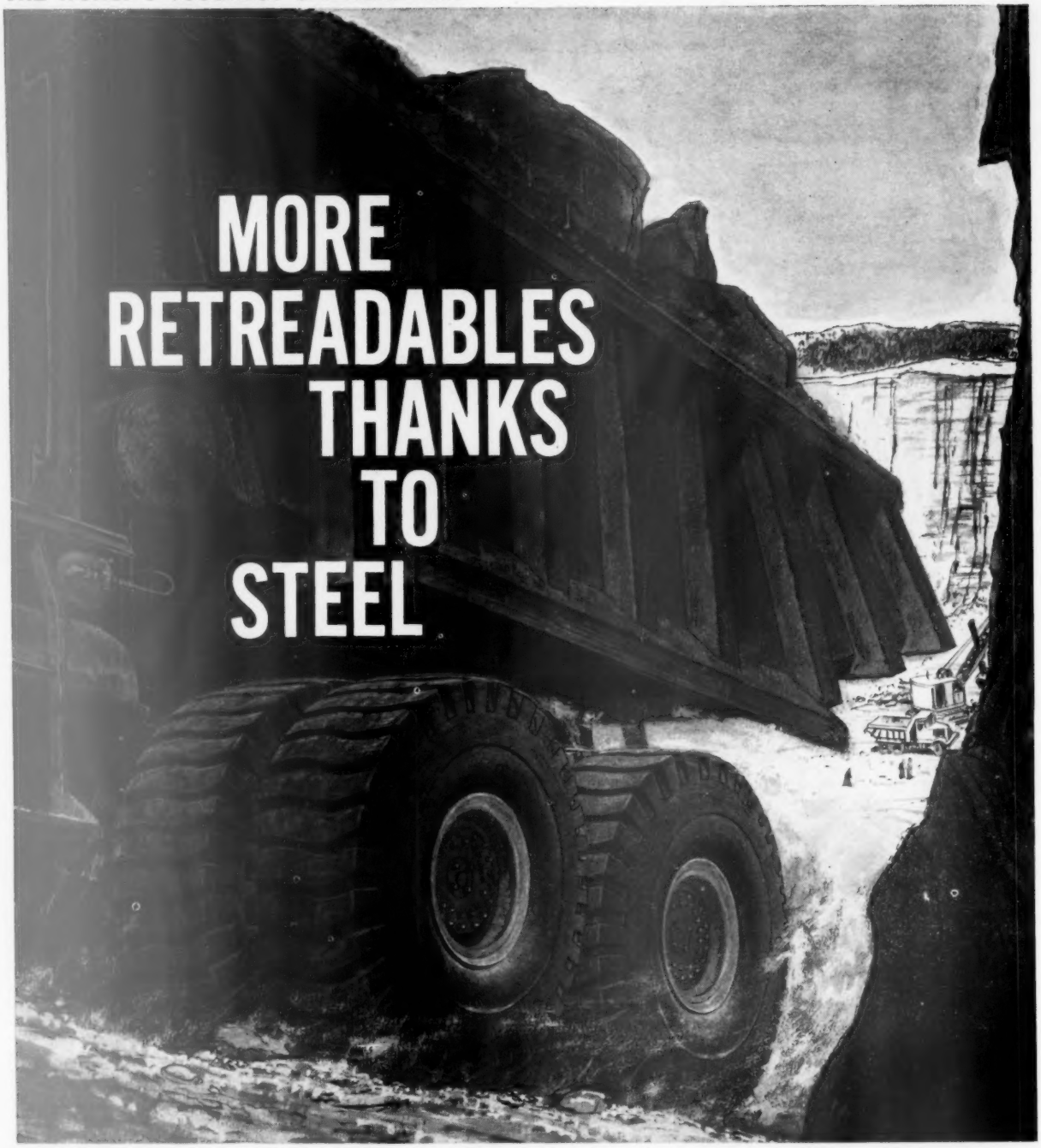
THE WORLD'S TOUGHEST OFF-ROAD TIRE



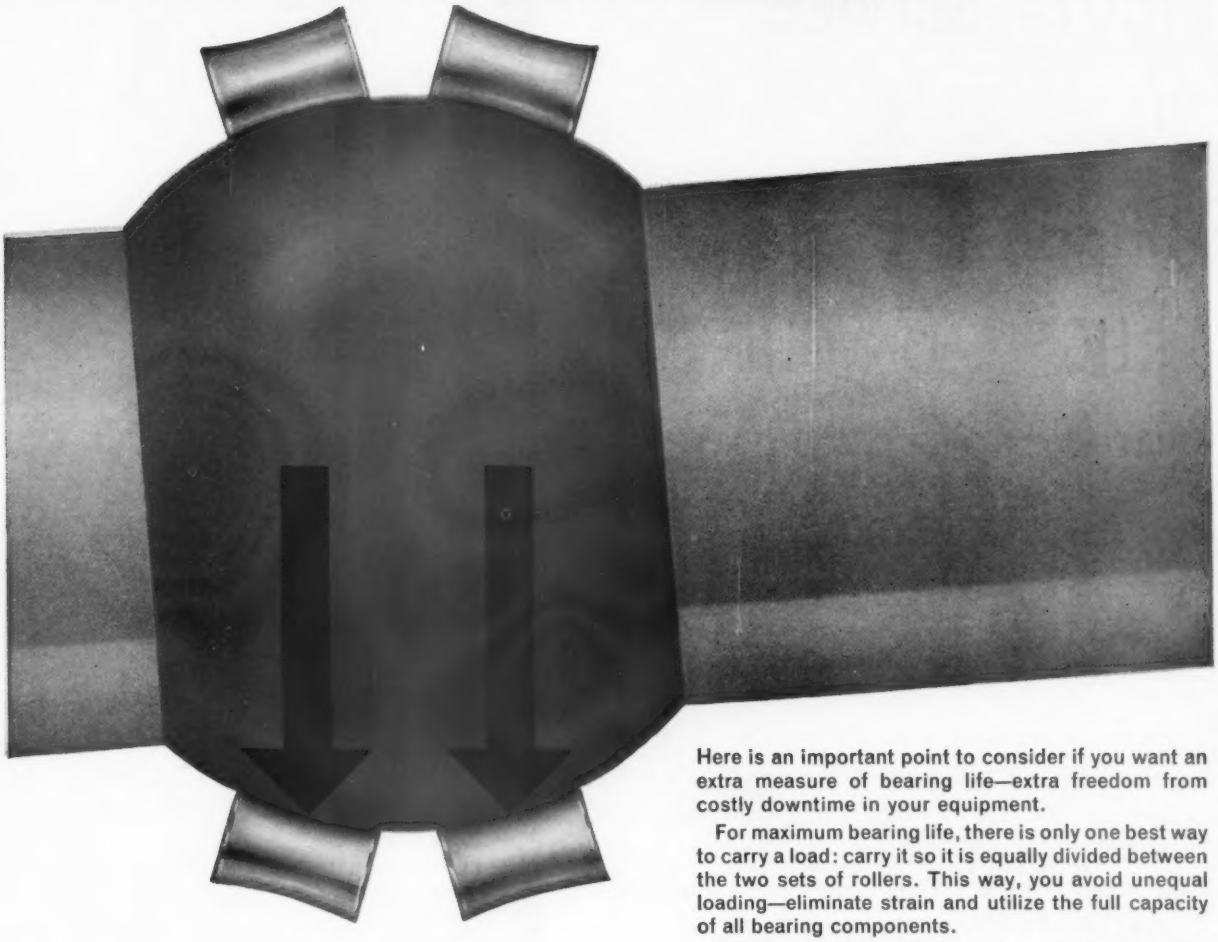
*STEEL REINFORCED TREAD

U. S. ROYAL SUPER CON-TRAK-TOR S.R.T.* Deeper tread at center and shoulders—steel reinforced for "chain-mail" resistance to cuts and impact failures • Each brass-coated steel filament is rubber insulated—can't rust out • Double-strength nylon cord body • More durable carcass • More tires retreadable • Prove-test them on your present equipment, specify them for your new equipment. Call your U. S. ROYAL DEALER.

U.S. ROYAL SAFETY 1st TRUCK TIRES

US RUBBER UNITED STATES RUBBER
Rockefeller Center, New York

ELIMINATES MISALIGNMENT STRAIN



maintains

equal load distribution

despite

changing misalignment

Here is an important point to consider if you want an extra measure of bearing life—extra freedom from costly downtime in your equipment.

For maximum bearing life, there is only one best way to carry a load: carry it so it is equally divided between the two sets of rollers. This way, you avoid unequal loading—eliminate strain and utilize the full capacity of all bearing components.

With Shafer-Rex design, misalignment is eliminated before it reaches the rollers. So, despite shaft misalignment, the load in a Shafer-Rex is always aligned and equally divided on the rollers—providing extra protection against the strain of any punishment that might be dished out.

Original Shafer-Rex design is the reason. The inner race of a Shafer-Rex Self-Aligning Roller Bearing is a segment of a sphere; rollers are concave. With this design, the only part affected by misalignment is the inner race. Roller assemblies remain in the aligned position, carry the load equally to assure uniform loading through the center of each roller—a real lifesaver.

For information, write: CHAIN Belt Company, 4604 W. Greenfield Ave., Milwaukee 1, Wis. In Canada: Rex Chainbelt (Canada) Ltd., Toronto and Montreal.

SHAFER® REX® SELF-ALIGNING ROLLER BEARINGS

Better service accessibility alone makes the "Euc" C-6 your best tractor buy

In the Euclid C-6 crawler you get the advantages of job proved components and years-ahead engineering that keeps down-time and operating cost to the absolute minimum. You get unitized assembly of major components and service accessibility that is unsurpassed by any crawler . . . replacement labor costs are well below those for comparable tractors. For example, complete removal and replacement of a C-6 radiator takes less than one third of the time required for the same work on a competitive machine.

With easy accessibility for servicing and maintenance, the C-6 gives more work-time on the job . . . steps up production . . . helps beat the profit squeeze by cutting operating costs to a new low.

EUCLID Division of General Motors
Cleveland 17, Ohio

Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland

Full-power shift . . . this Euclid C-6 crawler responds like nothing you've ever touched!

Get all the facts and figures on the C-6 . . . you'll find low operating cost plus proven reliable performance make it your best tractor investment.

"Euc" C-6 gives you the advantage of easier servicing ***plus*** *these top performance features:*

PROVEN POWER
PROVEN TORQMATIC DRIVE
FULL POWER SHIFT
COMMON STEERING-BRAKING
FAST-AS-A-FOX RESPONSE
EXCEPTIONAL MANEUVERABILITY

Brief specifications . . . 211 net h.p. delivered to power train . . . torque converter and semi-automatic transmission . . . independently suspended final drives . . . oil cooled multiple disc brakes . . . dry type air cleaner . . . 7 track rollers on each side . . . rear-mounted radiator.

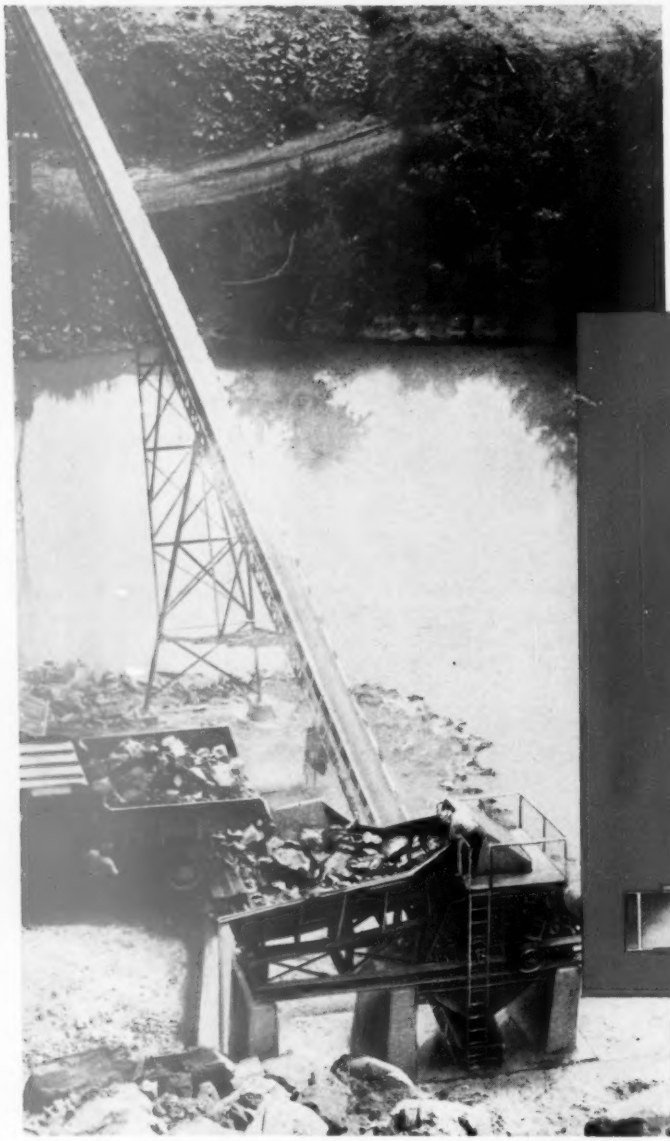
A NEW DESIGN CONCEPT THAT SETS NEW STANDARDS FOR PERFORMANCE AND LOW OPERATING COST IN THE 200 H.P. TRACTOR CLASS

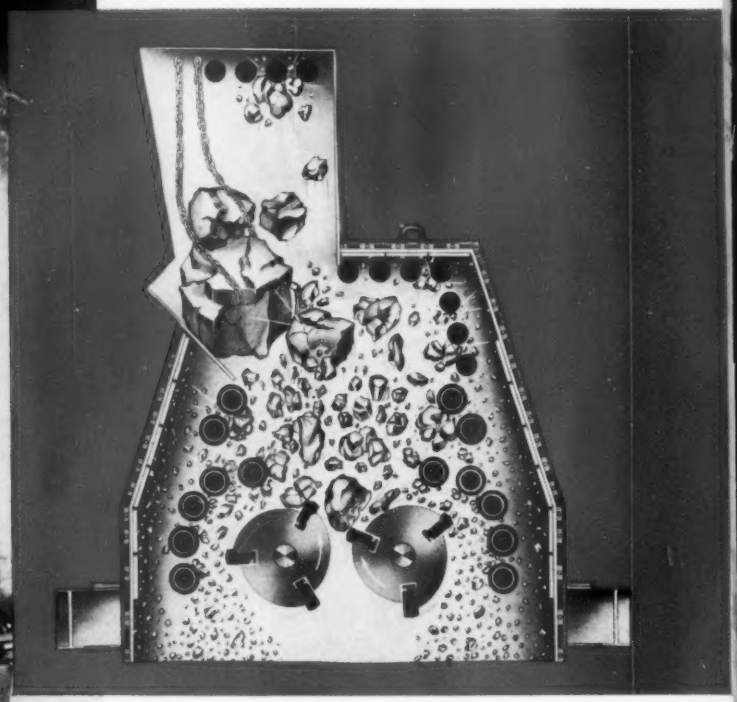
GM GENERAL MOTORS EUCLID

EUCLID

FOR MOVING EARTH, ROCK, COAL AND ORE

"We're really sold





OWNERS LIKE THESE CEDARAPIDS BENEFITS

Impellers rotate in opposite directions

Counter-rotating impellers direct rock upward and outward to utilize the entire breaking chamber for maximum production. With impellers rotating in opposite directions, there's no possibility of one impeller throwing rock into the other, putting a greater load on it and causing excessive wear on the impeller and hammers.

Breaks rock against rock

High angle of feed permits maximum penetration of rock into the hammer circle where it receives a square, sharp blow that hurls the rock back into the breaking chamber at terrific speed. With rock breaking against rock in suspension, there's 50% less contact of stone on metal. Manganese wear (and maintenance costs) are sharply reduced. Reduction ratios of 40 or 50 to 1 are common.

Versatile control of product size

Ricocheting rock is controlled in the breaking chamber by vertically adjustable breaker bars over the impellers until it is the proper size for discharge. By varying the impeller RPM (the faster the speed, the smaller the material) product size is further controlled. And only with *counter* rotation can the impellers be run at different speeds to blend materials.

True impact action

There's no pressure crushing because there's no wedging action in the lower crushing area. Wide discharge opening eliminates any scuffing or grinding which results in excessive fines as well as excessive wear and power consumption. It is Cedarapids' true impact action that upgrades the product to the desired cubical shape.

Produces highest quality aggregate

You'll meet toughest specifications for top quality aggregate with extremely low percentages of flat or elongated particles or soft stone. Six Double Impeller and two Single Impeller models meet every need.

on our whole Cedarapids plant–especially this

DOUBLE IMPELLER IMPACT BREAKER"

Charles and Pete Day, owners of Clarksville Stone Company in Clarksville, Tennessee, are new Cedarapids owners. They've used other equipment in the past, but now they have a 100% Cedarapids plant, they're completely sold on the benefits of Cedarapids engineering . . . especially their 3645 Double Impeller Impact Breaker.

Mr. Charles Day says, "It's been an education to see this machine work. We've never seen a unit that crushes stone as rapidly and easily as this Cedarapids Breaker. We're getting around 300 tons per hour and the stone is considerably smaller than we expected. I'd say 90% of the broken stone will pass 2" minus, which is very fine."

In addition to the Double Impeller, the Clarksville plant uses two 4033 hammermills and two horizontal vibrating screens, one 48" x 14' and the other 60" x 16'. For final gradation, the 16' screen has 7/8" cloth on the top deck, the second deck is for 5/16" chips, and the bottom deck is a 1/8" lime screen. "This Cedarapids plant will more than meet our needs or any needs we see in the near future," says Mr. Day. "We are really sold on the whole plant."

Clarksville Stone's plant was engineered from feeder to stockpile to meet the Day brothers' specific requirements for capacity, finished products, and low production costs. It will pay *you* to call on Cedarapids Stationary Plant Engineers to tailor a plant to *your* needs. Ask your Cedarapids Dealer for complete details.

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa

Cedarapids Built by IOWA

For jobs on the move **you'll get big primary capacity with a 3042 or 3645 Double Impeller Impact Breaker *on wheels*, with your choice of apron feeder, ground level feeder, single or double deck vibrating grizzly or a vibrating grizzly-feeder unit. For intermediate reduction, use a Portable 3026 or 4336 Single Impeller Impact Breaker.**

S-961N

new machinery

● A special type of rubber hose has been developed by B. F. Goodrich for installation on barge docks to handle pressurized cement loading.

The hose, "Convertapipe," in one application carries cement at a rate of 600 bbl./hr. from storage silos to barges. Limestone, granulated slag, and silica sand flow through the hose under a pressure of 30 lb. per cu. in., creating a sand-blasting action that would destroy most surfaces. The heat generated during manufacture is retained by the cement in storage; therefore, temperatures inside the Convertapipe often reach 200 deg.

In 15 months the 46-ft. hose has carried more than half a million barrels of cement. It is used about 16 hr. a week most of the year. Flexible hose has to be used because the barges sink lower in the water as they are filled. **(350)**

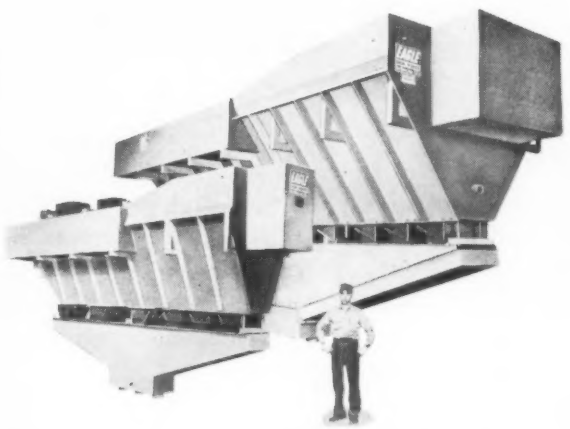
● Provision of more reliable reception in heavy traffic areas and extension of the operating range of 2-way radio systems is offered by a new product available on the Motorola Inc. transistorized Motrac low band (25-50 mc) mobile radio line.

The device, the "Extender", eliminates impulse interference from the radio-equipped vehicle and from all other vehicles in the vicinity. The patented Extender circuitry is offered as the first effective solution to the degrading effects of ignition noise. The Extender operation "turns off" the mobile receiver for the 2 to 3 microsecond duration of each ignition impulse. As it takes hundreds of microseconds to transmit a single vowel, quieting the receiver for the impulse duration does not affect the clarity of the message.

Range and reception in direct communication from one mobile to another are greatly improved through use of the new circuitry.

Another feature of the new radios is the rejection of intermodulation and desensitization generated by signals from other 2-way radio systems, and AM, FM, or television broadcast stations. A 3-position switch on the radio control head enables users to select automatic ignition noise suppression, intermodulation rejection, or standard receiver operation. **(351)**

● A series of tanks two feet wider than the standard series of water scalping - classifying tanks is being offered by Eagle Iron Works.



The standard tanks are held to 8 ft. in overall width and 32 ft. maximum length for ease of highway transportation. The 10 ft. wide series tanks are available in lengths of 24, 28, 32, 36, and 40 ft.

Advantages of the wide tanks are that initial equipment costs for tanks and supporting structures are saved, and headroom is saved. The tanks permit handling of greater water gallonages in each tank and/or retention of finer mesh particles. Materials are spread out for sharper classification than is possible with a multiple installation of the standard width tanks. For example, a single wide series tank can be used where a double installation of the 20 or 24 ft. length of standard tank was required previously. In large capacity plants a double installation of wide series tanks can be used where a triple installation of standard tanks was previously used.

As the larger volume of material handled increases wear the wide series tanks are equipped with cast Ni-Hard chromium-nickel iron alloy adjustable splitter gates and collecting-blending flumes, constructed in sections to simplify maintenance. Ni-Hard trough liners are also available.

In the picture the Eagle water mizer tank is shown next to the 10-ft. wide tank. The feature of the water mizer (5 ft. 9 in. wide and 20 ft. long) is that it operates on about half the water required by a standard width tank. Standard tanks can be provided with a longitudinal divider plate to simulate the low gallonage operation of the water mizer tank operation, allowing conversion to standard operation should conditions change. **(352)**

and equipment

for further information use card on page 155

● Two-stage air filters—two filter elements in a single housing, with each element independently sealed—for both heavy duty automotive and industrial engines have been introduced by Purolator Products, Inc.

The two-stage, dry-type air filters were designed for efficient engine protection when equipment is continually operated under abnormally dusty conditions, such as mining and quarrying, or sand, cement, and gravel hauling.

Both the first and the second stage elements of the filter operate independently at 99.8 percent efficiency at all engine speeds. The function of the second stage element is to provide continued engine protection in case the first stage, or working element, is damaged. If the first stage element and sealing gaskets operate at maximum efficiency before requiring service or replacement, the second stage element will last indefinitely.

The elements are made of a plastic-impregnated cellulose with depth type radial pleating for greater dirt holding capacity. They are rated from 450 to 1,150 c.f.m., with a low initial restriction. The low initial restriction provides an element life from 600 to 2,000 hr. of continuous use. **(353)**

● An 8-in. submersbile dewatering pump, Model S8A1, with a capacity that ranges from 1,000 g.p.m. at 148-ft. head to 2,700 g.p.m. at 40-ft. head, is being offered by The Gorman-Rupp Company.

The unit has an oil-filled motor housing and dual seals that run in oil. Height is 31 in.; diameter, 28 in. Aluminum construction reduces the weight to 775 lb. The strainer area is 480 sq. in., with 1-in. square openings. It has been field tested at quarries, gravel pits, and on the Dillon Dam Project in Colorado.

The 8-in. submersible is available with 65-hp. 1,750-r.p.m. motor that operates on 3-phase, 60 cycle, 220 or 440 volt current. Fifty feet of cable is provided with each unit. **(354)**

● A ¾-cu. yd. crawler-excavator has been designed by Harnischfeger Corporation for service as a crane, dragline, clamshell, back-hoe, or shovel.

According to the manufacturer, a number of "extra features" have been incorporated as standard equipment. Independent propel drive permits the machine to "move up" simultaneously with swing, dump, and/or other machine functions, thereby speeding work cycles. Four travel speeds range from ½ to 3¼ m.p.h. Propel brakes are released and set automatically. The tractor-type crawlers feature large diameter sprockets and replaceable pins.

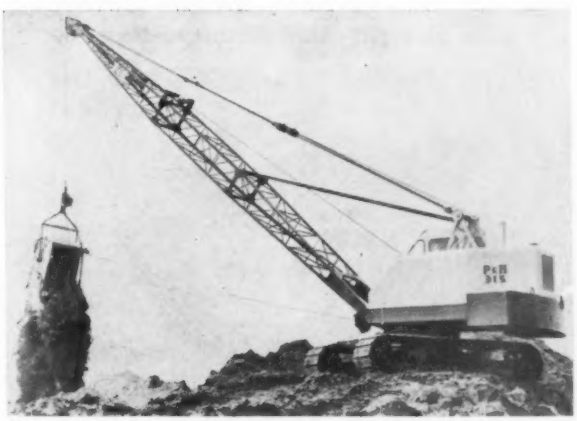
The new unit uses "power-box" design, in which the entire structure of the upper is an integral all-welded unit. Bearing surfaces are in-line bored, and vital gears are sealed in and running in an oil bath.

Another standard feature is the independent planetary gear-type boom hoist. Controls for every operation are hydraulic.

Use of high strength alloy steel reportedly provides the strongest crane boom available, with the lowest relative weight. Maximum boom length for crane work is 70 ft., plus jib extensions up to 25 ft. long. Maximum boom length recommended for dragline-clamshell work is 40 ft.

The machine carries a Power Crane & Shovel Association rating of Class 10-36 as a lifting crane.

A gooseneck boom, of all welded box-section design providing structural strengths without excess weight, is available for back-hoe service. The 18½-ft. long boom can be equipped with dippers varying in cutting widths from 30 to 38 in., or up to 42 in. with side cutters. The back-hoe has a digging depth of 20 ft. at a 45 deg. boom angle. **(355)**



● A car desk designed to fit all vehicles from the largest truck to a compact auto is available from Mishek Supply Company.

The writing surface measures 12 x 20 in. and comes in a choice of two materials, masonite and plastic. A clip for holding papers or a route book is optional. The top lifts off to form a conventional clipboard for use outside the vehicle, yet slips securely in place in the desk frame.

The unit is constructed of metal, and is strong enough to hold a typewriter. The desk adjusts both horizontally and vertically, without the use of tools, to fit the writing habits of the user. When not in use the desk folds up, occupying 2 x 12 in. of front seat space. It can be used equally well in the back seat by hanging it over the back of seat, and adjusting thumb screws. **(356)**

● Two new and improved versions of Select-O-Matic automatic type transmissions are optional equipment for heavy-duty International trucks available from the motor truck division of International Harvester Company.

Both Select-O-Matics use 5-speed synchromesh transmissions in conjunction with IH-built torque converters and electro-hydraulic clutches. The clutches are disengaged for shifting by the depression of a button located on the gearshift knob, thus eliminating the clutch pedal.

The T-83 Select-O-Matic, with 13-in. torque converter, has ratios compatible with stop-and-go driving and off-highway operations.

The T-94 is a larger transmission, with a 14-in. torque converter, for use in gross load applications requiring additional engine power.

According to the manufacturer, users have reported savings in truck maintenance, safer and easier operation, higher average road speeds, and better performance, often with increased gas mileage.

Features include full-capacity oil filters, IH-built variable-capacity hydraulic pump, pressure-lubricated pilot bearings and main shaft gears, and nylon-faced transmission shift forks. **(357)**

● A Pylox-coated, jersey-lined work glove has been added to the Stanflex line of industrial gloves manufactured by The Pioneer Rubber Company.

The 10-in. liquidtight gauntlet (#510) has been designed with a single-seam, one-piece hand and gauntlet construction.

Pylox is a vinyl compound developed in the Pioneer laboratories. The puncture-proof material resists abrasion, snagging, and tearing. It reportedly does not deteriorate upon contact with oils, acids, caustics, or other harsh substances. An additional safety factor is that in cold temperatures the gloves remain soft, thereby not hindering hand and finger movement. According to the manufacturer the gloves can be cleaned easily. **(358)**

● The new 568 front-end loader with a variety of other front-end attachments, and the new 71 rear-mounted backhoe have been announced by Oliver Corporation for use on the Oliver 550 utility wheel tractor. The loader and backhoe are available individually, or in combination with the tractor.

The 568 loader, with 3,700-lb. breakaway and 1,800-lb. lifting capacity, is available in SAE-rated bucket sizes of ½-, ¾-, and ⅞-cu. yd. Front-end attachments include 72-in. backfill blade; tool bar; 1,000-lb. capacity fork lift; and crane that handles 1,000 lb.

Buckets for the loader have curved backs and high back spill plates. The main loader frame distributes the load to the front and rear tractor axles. Rubber bushings are provided at the rear of the loader frame.

The 71 backhoe has bucket sizes ranging from 12 through 36 in. in width, with capacities of 2 to 5½ cu. yd. An "Easy Latch" hookup permits quick detachment.

The 550 tractor, when equipped with the new loader and the new backhoe, has a single hydraulic system providing power for both attachments. Both components can be operated at the same time.

The tractor has a built-in hydraulic system for 3-point hitch attachments, and an external system for mounted equipment. It is available with a gasoline or diesel engine, and is equipped with a 6-forward and 2-reverse speed transmission, and Oliver's new advanced power-steering. Work speeds range from 1.5 to 7.21 m.p.h., with transport speed of approximately 15 m.p.h. The "Du-Al" transmission permits quick straight-line shuttle shifting from third forward gear directly into high reverse, and from first forward gear directly into low reverse, for faster loading operations. A short turning radius is featured. **(359)**

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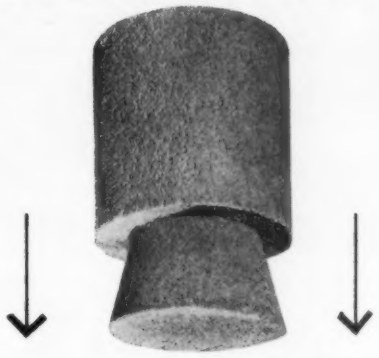
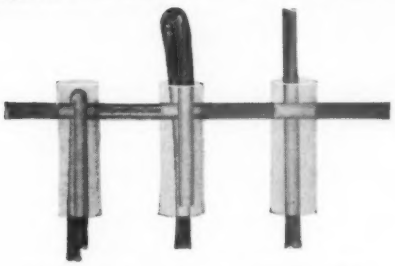
AUSTIN ACP PRIMERS

Six primers, each smaller than a man's fist, designed specially for use with fertilizer grade ammonium nitrates. Very insensitive to shock and abrasion. Three types possess rifle impact sensitivity of zero . . . may be more safely removed from holes that fail to detonate. Central fuse channel, cap well, other handy features.



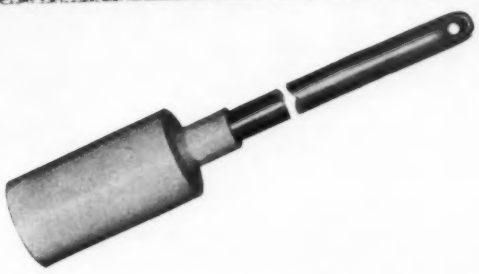
AUSTIN ATP TAMPING PLUGS

Seven cast cement plugs for tamping holes 4" to 10" in diameter. Plug is loaded cone first in hole behind the explosive. The base is tamped over the cone and seats itself solidly in the hole—tightly confining the charge. No additional stemming required.



AUSTIN FUSE CONNECTORS

Provide a quick, effective detonating fuse hook-up without tying knots. Simply thread fuse from shot hole through length of connector and press trunk line into grooved slots. Then return branch through end of connector over trunk line and pull tight.



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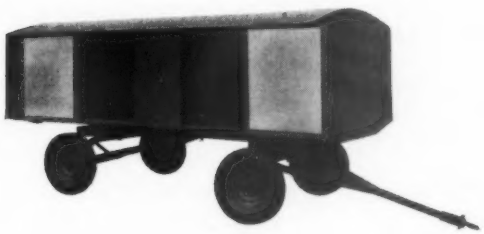

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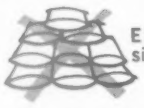
8.  Eliminates expensive bagging.

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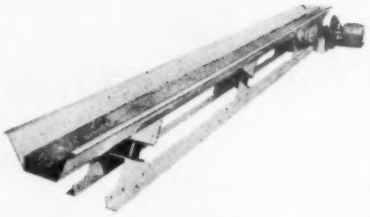
Enter 64 on card, page 155



● The "SYNCHRO-Flex" shear spring mounting eliminates coil and leaf springs in a design simplification of vibrating conveyors offered by General Kinematics.

The trough floats on rubber mounts to absorb and isolate the material and trough contact effect. Automatic stroke compensation for material load reportedly assures material flow, regardless of normal surge loads. **(360)**

● Tractor-mounted air compressors capable of delivering 125 cu. ft. of air per minute at pressures up to 100 p.s.i. are available from Atlas Copco, Inc.

The compressors, designed to draw their power from the tractor motor, are 2-cylinder, 2-stage, single-acting, V-type units with intercooling between stages.

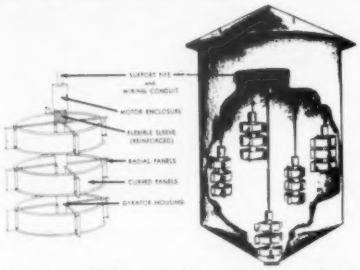
Equipped with adjustable connecting points, the units are intended for mounting on tractors with three point hydraulic linkage systems.

The new compressors are supplied with a splined propeller shaft for connection to the tractor power take-off.

The 125NT requires 38 horsepower on the shaft and delivers 125 c.f.m., and the 100IT requires 31 horsepower on the shaft and delivers 100 c.f.m. Because of their weight—860 or 700 lb.—the compressors can be operated either standing on the ground or in the suspended position without affecting balance of the tractor. **(361)**

● A unit bin activator for feeding dry materials from storage to process has been developed by Vibra Screw Feeders, Inc.

The unit is self-contained, and includes a framework and gyrator assembly. It is suspended in a storage bin to promote the flow of solid materials around it. A single activator will influence about 400 cu. ft.



(a zone 8 ft. in diameter by 8 ft. deep). Two or more activators can be suspended within the storage area of a large bin.

All component parts are designed to fit through an 18-in. manhole, and can be bolted together within the storage bin. A ¾-hp. motor is sealed within an enclosure in the unit. This allows submersion of the entire assembly, including the motor, into the material within the bin. The assembly itself does not rotate, but transmits vibratory impulses directly into the surrounding material.

The amplitude of vibration to the material reportedly is greater than could be achieved through an externally mounted vibrator operating through a bin wall.

The bin activator is hung from some point above the hopper, either from a bracket on the side of the bin, or (shown in diagram) directly from the roof of the bin on a standard 1½-in. pipe support, which also serves as a conduit for the wiring. Additional supporting cable can be installed, when required, inside this same pipe. The standard unit weighs approximately 200 lb. **(362)**

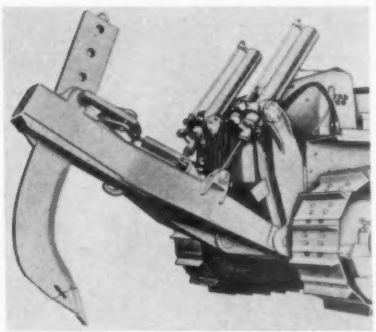
● Improvements in the design of the extra heavy duty D9 Model C ripper, manufactured by Kelley Products for the Cat D9 tractor, have increased the service life while reducing operating cost.

The use of higher strength, higher alloy steels has permitted a more compact, yet lighter weight unit, with increased wear resistance. The new

unit is reportedly easier to install.

Integrally mounted for better maneuverability and more positive control, the Kelley D9C ripper can rip almost any material, including solid rock, to depths of 84 in.

Single and triple shank models are offered with a variety of shank types and boots to fit a machine for any material. The welded box-section tool bar is controlled by 7-in. diameter, double-acting cylinders with a 48-in. stroke. (363)

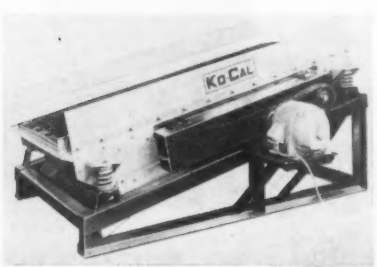


● A vibrating screen, the "Twin-Shaft," that uses two shafts to provide screen pulsations, has been announced by Koehring Company of California, a division of Koehring Company.

The double-eccentric shaft construction gives a uniform pulsating action over the length of the screen, eliminating gallop and providing higher capacity.

Other features include: screen cloth bolted to side plates to eliminate welding tensions; oversize positive drive belt to maintain timing or rotation of both shafts; all three belt sheaves eccentrically bored to counteract screen action, eliminate belt whip, and give a smoothly running screen; and a weight saving of 25 percent over single-shaft screens.

The Ko-Cal "Twin-Shaft" is available in three sizes: 4 x 8 ft., 4½ x 10 ft., and 5 x 14 ft. (364)



MARION HOPPER TRAILERS

OHIO FIRM USES MODERN MARION HOPPERS TO MOVE BIG TONNAGES

Nine hours a day—five days a week, three Marion Hopper Trailers haul tons of material from pit to tipple for American Aggregates Corp. of Greenville, Ohio.

They have performed this heavy chore with "very little trouble. And that's saying quite a bit, because they are really put to the test every day," says Plant Manager Leo Hinders.

Since purchasing their first Marion in 1953, American Aggregates have added two more, one in 1955 and their third in 1960. This confidence in Marion Hoppers can only come from dependable on-the-job performance witnessed by men responsible for running their business at a profit.

If you're in need of the kind of outstanding hauling performance taking place at American Aggregates, call your nearby Marion Distributor or, write direct for all the details on Hoppers and the complete Marion line.

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BODIES AND HOISTS

MARION

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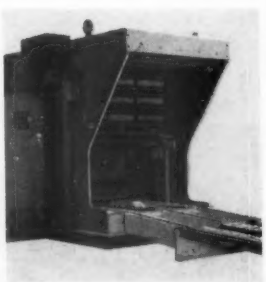

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MINE TO MARKET P D

Washington News Letter

(*Concluded from page* 11)

than $500 will be able to buy a $15,000 home with an F.H.A. insured mortgage having a term of 35 years. Under certain circumstances, it will be possible to arrange for 40-year mortgages. This not only makes the down payment nominal but is designed to result in carrying charges which are no greater, and in many cases probably less than, rental costs. There is almost no question that a much needed boost to the home building industry will result.

But many problems will be created with respect to the sales of older homes. To a certain extent this aspect was recognized in the legislation, which also permits loans on quite advantageous terms for making improvements on such older homes. The Act provides for special rehabilitation loans, also backed by F.H.A., of up to $10,000. These may run for 20 years with the maximum interest rate 6 percent. The only limitation is that the total amount of obligations against the house (that is, the total of the mortgage and these rehabilitation loans) may not exceed the amount which F.H.A. would authorize for a new mortgage upon purchase of the home.

This should provide a boost for smaller construction firms—those who do home improvements such as the addition of porches or dens or the rehabilitation of basements, renewed plumbing, etc. Unfortunately, this area is one in which the sharpest practices have developed in the past. It will require much policing to prevent a recurrence of high pressure salesmanship used in convincing people to make, at very high cost, home improvements which they do not really need.

The Housing Act also provides low-cost financing for longer projects—such as apartments for low-income families, apartments for the elderly, low-rent public housing projects, and college housing loans. The latter goes well beyond dormitories since it permits at least a tenth of the money to be used for other types of educational facilities, such as dining halls, cafeterias, youth centers, etc.

These factors indicate a busy period for the construction industry, beginning almost immediately and running for some years. Also indicated is a federal budget deficit in the neighborhood of several billion dollars a year. The Administration is gambling that the new income generated by such expenditures will in turn encourage other economic growth, thereby generating even more income. Since the Federal Government is a participant through the income tax laws in every increase of income, it is possible that the increased tax revenue will be sufficient to offset the expenditures.

The optimistic Kennedy Administration is expecting this cycle to happen in the fiscal year beginning one year from now. In fact, every administration for the last several decades has "expected" that such might happen. The Eisenhower Administration prayed for it devoutly, but it never quite obtained the desired result. Only the Truman Administration actually experienced such a budget surplus but—in all honesty—it was an accident.

Labor Developments

(*Concluded from page* 13)

little to solve the members' most serious problem, which is the danger of unemployment. The companies, of course, argue that this problem can not be solved at the bargaining table. While the auto union has agreed that it cannot be fully solved in collective bargaining, it has, by demanding supplementary unemployment benefits, insisted that some approach to a solution can be worked out there. Thus, to satisfy this haunting fear, it is likely that some improvements in those benefits will be required. This is particularly likely since the counterpart program of the principal rival union (the steelworkers) provides far more liberal unemployment benefits.

This rivalry with the steelworkers union is another force impinging on the current bargaining. The automobile workers have been the innovators, but the steelworkers have gained more from the innovations. In addition, the steelworkers union has been more successful in bargaining larger wage increases than the automobile workers.

One of the reasons for that success is purely accidental. The expiration date of the last two automobile contracts occurred during periods of low demand for automobiles while the expiration date of steel contracts occurred during periods of high demand. Thus the steel workers were in a more advantageous bargaining position.

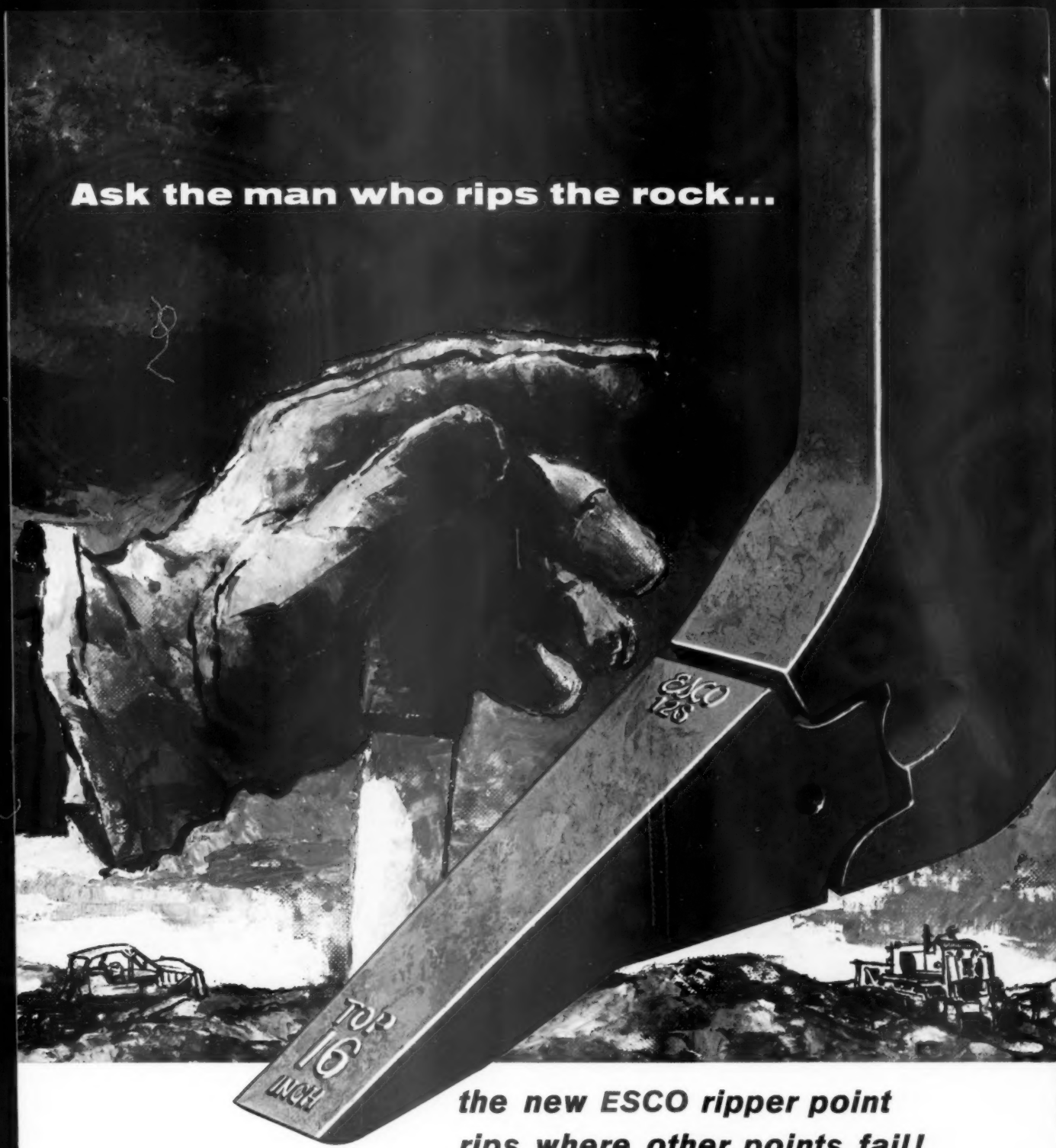
In addition, the steel industry was in a far better position to pass on to its customers the additional cost of wage increases. Furthermore, by precipitating a crisis, and thereby forcing the Federal Government to intervene, the steel workers have been able to get the government to apply pressure on management to yield to their demands.

Finally, because much of the remuneration that the steel industry pays its workers is on an incentive basis, an increase in base wages yields a somewhat greater increase in earnings. At the beginning of the bargaining relationship, the automobile union insisted that wage incentives be eliminated from all but the smallest companies, thereby losing this opportunity for automatically increasing their negotiated wage adjustments. The net result may be seen in the statistics on the increases in average earnings in the decade 1949 to 1959. While the increase in basic steel amounted to $1.43 an hour, the increase in automobiles amounted to only $1.00 an hour. This gap of 43 cents an hour makes it much more difficult to exercise the required restraint.

If an agreement is reached without outside interference, it will be a testimony not only to the intrinsic strength of collective bargaining but also to the ingenuity and competence of the bargainers.

A. RAY SMITH, Standard Industries, Inc., Tulsa, Okla., was elected president of the Hot Mix Asphaltic Concrete Association of Oklahoma at the annual meeting of that group.

DEVEREAU BACON JR. has been named vice-president, sales, for the Florida Portland Cement Division of General Portland Cement Company, Chicago.



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This newly-designed Ripper Point now rips tough material that previously had to be shot.

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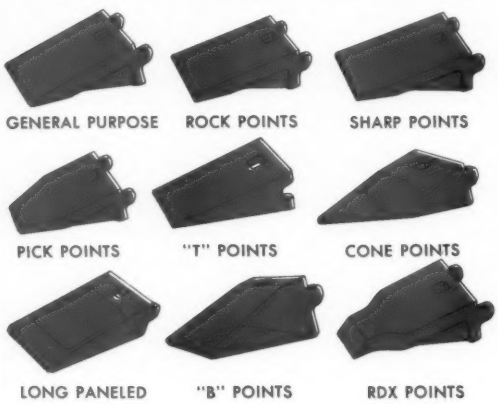
- 16" for tough production ripping.
- 18" for general ripping.
- 20" for easily ripped material.

AVERAGE RIPPER POINT LIFE IN ON-THE-JOB TESTS

	Job No. 1	Job No. 2	Job No. 3	Job No. 4
ESCO Ripper Points	5½ hours	16 hours	4 hours	56 hours
Other Ripper Points (average)	½ hour	2 hours	1½ hours	8 hours

Longer life, superior penetration, increased production—these are the three features of *ESCO*'s new ripper point that mean lower costs for you. You can easily convert all your rippers to *ESCO* points. Ask your local *ESCO* dealer about cast *ESCO* shanks and *ESCO* weld-on nose pieces to convert any shank.

9 POINT TYPES FOR EVERY DIGGING CONDITION



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Industry Personalities

GROVER M. HERMANN, chairman of the board of American-Marietta Company, recently received an honorary doctor of laws degree at the 110th commencement of Manhattan College in New York City. Mr. Hermann is the founder of American-Marietta, which was launched in 1913.

JAMES A. HUNTER, formerly assistant sales manager, Minneapolis district, Universal Atlas Cement Division of U. S. Steel, has been appointed sales manager of the Kansas City district.

J. A. Hunter

J. O. Reid

The appointment of JOHN O. REID as assistant sales manager was also announced. He succeeds Mr. Hunter in this post.

Mr. Hunter joined the cement company's sales office in Kansas City, Mo., in 1938. In his new post he succeeds THOMAS E. BERTELSEN, who has been transferred to the division's Chicago office.

WILLIAM G. ASH, a vice-president of the New England Lime Company since last year, has been elected president and chief officer of that concern. He succeeds C. C. LOOMIS, who was elected chairman of the board.

ROBERT G. WATSON has been appointed sales manager of the Albany, N. Y., district, Universal Atlas Cement Division of U. S. Steel. He succeeds HARRY E. BERGOLD, who is retiring after 20 years of service.

R. MCLEAN CAMPBELL, president of Harry T. Campbell Sons' Corporation, Baltimore, Md., has been named to the board of directors of The Flintkote Company. The Campbell company, acquired by Flintkote last year, is a major producer of crushed limestone and calcium carbonate products, feldspar, gravel, and Sakrete.

R. M. WILSON was recently named division sales manager of the Lone Star Cement Corporation, succeeding C. U. BROWNLEE, retired. Mr. Wilson has been with Lone Star since 1937.

C. G. HECKERT was named assistant divsion sales manager. He has been associated with the firm since 1938.

J. C. MEIGHAN has been appointed general plant superintendent of the Penn-Dixie Corporation's Buffalo plant. Mr. Meighan, who has been assistant plant superintendent, succeeds ALBERT A. OESTERLE, retired.

Mr. Oesterle is retiring after a 47-year career in the cement industry. He became general superintendent of the old Federal Portland Cement Company in 1933 and continued in that capacity when the company was purchased by Penn-Dixie in 1955.

JAMES RAY PRINCE has been appointed a sales representative for Marquette Cement Manufacturing Company in Nashville, Tenn. He has been with Marquette at the Cowan plant for 12 years. Mr. Prince replaces T. E. HOWINGTON, who is retiring after a 25-year association with the firm.

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Enter 71 on card, page 155

Michigan's primary job: cleaning around two 6-yd shovels, usually spotted 1,500 to 1,800 ft apart.

Typical Michigan odd-job: centrally stockpiling oversize rock chunks for secondary breakage.

To clean and pile average 40,000 ton blast takes the high-speed 56,000 lb Michigan only half a day.

Job-to-job moves are made at truck-like speed. Unit's tires roll easily over the rocky footing so abrasive to tracks.

One 262 hp Michigan Dozer does work of two big crawlers: cleans around two 6-yd rock shovels, also piles blast rock at Huron Portland Cement Company quarry.
A typical saving:

60% CUT IN SHOVEL CLEANUP TIME

At least three important savings have been realized by the Huron Portland Cement Company quarry, Alpena, Michigan, since their 262 hp Michigan Tractor Dozer took over pit maintenance duties.

ONE, the Model 280 Michigan Tractor Dozer and its one operator do the work of two 28,000 lb class crawlers and two operators.

TWO, Michigan tires have eliminated annual or bi-annual track rebuilding. Tires on the Model 280 are expected to last "about twice, maybe three times as long as tracks," say men on the job...an estimate based on the quarry's three-year experience with a smaller (162 hp) Model 180 Michigan Dozer, recently moved from the quarry to the company cement plant.

THREE, the Michigan, with its high speed and power, saves time on almost every individual cleanup chore. To be sure, this saving may be only 2 to 5 minutes per job . . . but added up over 6 days a week, 52 weeks a year, the sum total makes an important contribution in more loads delivered, quarry face to crusher grizzly.

For instance, take the saving in shovel cleanup. Back in Huron Portland's crawler days, a good operator could clean the spillage around one shovel in 5 minutes. While the crawler dozed, the 6 yd electric shovel couldn't load (primarily because its power cable blocked one side). Today, the shovel still cannot load during cleanup. But the high-speed Michigan does each cleanup in 2 minutes! Thus, 3 minutes are saved. Three minutes saved, 8 to 12 times a day, *at each of Huron-Portland's two 6-yd electric shovels.* That's 5 to 7 extra 26 to 27 ton truck loads *from each shovel* each day—260 to 360 extra tons of stone each day for the crusher (and the cement plant).

75% cut in blast cleanup time

Another example of time saved is in blast cleanup. One to four times a week, Huron-Portland's crew shoots the 100 ft high quarry face. Each blast breaks up 35,000 to 45,000 tons of limestone. Trouble is, some rock gets thrown 100 to 200 feet, sometimes 300 ft. Used to take a crawler one to two days to police the area and gather all the rock. Now, the Michigan Tractor Dozer does the policing job in half a day. (Here is one place the 262 hp Michigan Model 280 noticeably outperforms the 162 hp Michigan Model 180 used so successfully for three years. The bigger Model 280 can move heavier rock . . . can often do in two passes what took the Model 180 four passes . . . and it can pile the rock several feet higher.)

Stockpiles oversize rock . . . biggest chunk moved, 16½ tons

Being the only *mobile Dozer* in the 450 acre pit means the Michigan does lots of odd jobs too. It moves drilling machines, air compressors, and shanties. It cleans spillage from the 2,000 ft of shovel-crusher haul road. Cleans around the crusher. Drives a mile to the cement plant to stockpile coal, when necessary. Moves power cable for the shovels. In winter, it keeps roads and building areas free of snow. It even moves oversize rock chunks away from shovel for secondary breakage. Biggest rock chunk dozed by the Model 280, to date, measured 4x5x10 ft, weighed about 33,400 lbs.

Late Bulletin!

Since writing this report on Huron Portland Cement's quarry operations we have learned that the veteran Model 180 Michigan mentioned above has been traded for a new 290 hp Model 280. This larger, more-powerful Michigan Tractor Dozer is now working in the quarry—the older 262 hp Model 280 has been assigned coal handling and general yard jobs.

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EATON PLANETARY DOUBLE REDUCTION AXLES

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LAST LONGER
REDUCE MAINTENANCE

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2. **SECOND REDUCTION** in planetary gears

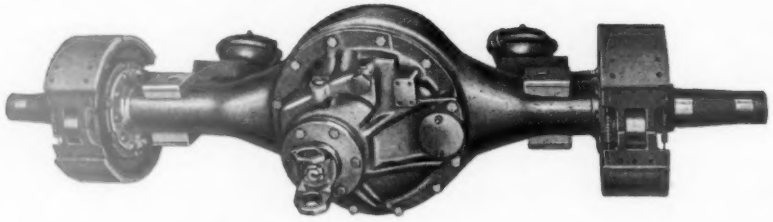
Eaton PDR Axles have established outstanding performance records in all types of heavy-duty operation. By actual comparison, they cost less to buy, less to maintain.

Ask your truck dealer for complete information about Eaton PDR Axles.

Because Eaton PDR Axles weigh less (size for size) than conventional herringbone or spur gear axles, PDR-equipped trucks haul more legal payload.

Two exclusive Eaton design features contribute to materially longer axle life: Gear tooth loads are distributed over four rugged "planet" gears, reducing stress and wear; the Eaton forced-flow lubricating system provides positive lubrication to all moving parts, even at slowest vehicle speeds.

Simple construction—similar to the famous Eaton 2-Speed Axle which is familiar to all truck servicemen—holds maintenance cost to a minimum. Repair parts are readily available—many of them interchangeable with other Eaton Axles.



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Two Million Eaton Axles
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This mark tells you a product is made of modern, dependable Steel.

TIGER ON THE SPOT AT LEWISBURG LIMESTONE

Repeat performance. USS Tiger Brand Wire Rope worked so efficiently on this shovel that the owners plan to use it on all their equipment.

DIG, DIG, DIG—FOR DOLLARS

Fred and Ford Moss have a moneymaking operation digging limestone near Lewisburg, Tennessee. They bought an efficient shovel that scoops about 200 tons of stone an hour. It came equipped with USS Tiger Brand Wire Rope which Ford Moss describes this way, "Our hoist rope lasted longer than any rope we had ever used. We were beginning to think that it was never going to wear out. I can't tell you the exact number of tons it has produced but we're satisfied that it has dug up plenty of dollars for us."

The hoist rope is a Tiger Brand 1-inch 6x41 Lang Lay IWRC made of tough, abrasion-resisting Monitor Steel. Every day it stays on the job means more profit to the owners. The two men also have a motor crane equipped with a drop ball on the end of another Tiger Brand Rope for breaking rock.

Wire rope is an important factor on a job like this. It keeps the machines operating at a profit. Just multiply this by the size of your own operations and use Tiger Brand—to dig, dig, dig—for dollars!

For the latest book on USS Tiger Brand Wire Rope, **contact your local distributor** or write American Steel and Wire, 614 Superior Ave., N.W., Cleveland 13, Ohio.

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York Drilling Co., Inc. drills

100,000 ft of 5" hole in 5 months

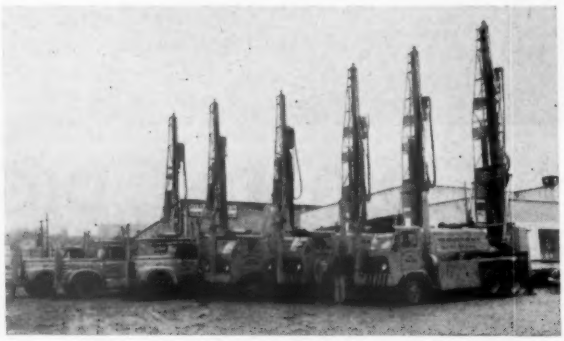
to provide crushed stone for Dulles International Airport

Four and at times five Ingersoll-Rand Drillmasters of the famous York Company have been drilling around the clock for the past 5 months putting down more than 100,000 feet of 5" hole in hard semi-granite diabase rock. Working at the quarry of the Chantilly Crushed Stone Co., Chantilly, Virginia, these completely self-contained drilling rigs have been drilling rock for the new jet-age Dulles International Airport.

These Drillmasters are part of a large fleet that has drilled 2,000,000 feet, or over 380 miles of 5", 6" and 6½" hole since 1953 in York's extensive quarrying and water-well operations. These same units drilled 449,636 feet of hole in 1959.

John W. Crerand, Vice President and General Manager of York Drilling Co., Inc., says that the Ingersoll-Rand Drillmaster is the best all-around blast-hole machine for contract drillers.

If you want to cut your blast-hole drilling costs, be sure to get the Drillmaster story. Ask your Ingersoll-Rand sales engineer for complete information.



Six of the York Drilling Company's Drillmasters —part of a fast-growing, fast-drilling fleet that has put down more than two million feet of hole since 1953, in both quarrying and water well work.

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A CONSTANT STANDARD OF QUALITY IN EVERYTHING YOU NEED FOR DRILLING ROCK

The Editor's Page

Safety Is A Personal Thing

THE season for annual safety reports has just begun, and we will be receiving these in growing numbers from many sources. They will include industry contests, national contests, automobile accident reports, home accident reports, etc. These reports will show, as usual, that there has been a little gain here and a little loss there, with a general trend toward gradual improvement in safety records over the years.

GENERALLY, however, the *rate* of improvement in recent years has gradually decreased, indicating, perhaps, that a level is being approached which cannot be passed. This barrier consists largely of the "human element," which probably always will be the chief cause of accidents in any category. It is becoming increasingly obvious that any further substantial reductions in accident rates must come from better control of this element.

Every day an observant and safety conscious person can see countless acts due to ignorance, carelessness, or thoughtlessness, which could lead to accidents—in the streets, in traffic, in offices, factories, homes, etc. It is just such acts which are the causes of many accidents and for which there is now no effective means of prevention.

UNDER various pressures almost every conceivable step has been taken to reduce our terrible accident tolls. Penalties are imposed, on the highways and elsewhere, for dangerous acts. Innumerable organizations of various kinds are constantly promoting safety. Industry has built safety into its plants, safety committees and programs have been organized, and personal protective equipment has been provided for employees. In spite of all this, however, the accident levels seem to have reached a point of diminishing return.

APPARENTLY, no further substantial progress can be made in safety without improvement in the personal angle. One of the best explanations of this barrier we have seen is contained in an article entitled *Safety is a Personal Thing* in a recent issue of the monthly letter published by the Royal Bank of Canada. This article points out that safety is a personal thing, and that every person can do something about it. Most accidents are caused by ignorance, carelessness, selfishness, irritation, or impatience; and all such accidents can be prevented. It is not enough, we are told, to put a guard around physical hazards; we must also put a guard around our thinking. Even if we are irritated by the conduct of other people, we must be careful not to react so as to create danger. We must not let inner compulsions drive us into dangerous practices.

"The only effective way to bring a factory or a home through a year without serious accidents," it is pointed out, "is to have everyone become part of a co-ordinated effort to apply thinking, experience, and ability to the problem." It is suggested that we give over preaching safety in a broad, grave, general way, and pinpoint it as a personal obligation. This, in our opinion, requires that every child be taught, through endless repetition and example, by parents, teachers, and later by employers, to think and act safely at all times. Only in this way, we are convinced, can further substantial reductions be made in our high accident rates.

Walter E. Trauffer

← Enter 76 on card, page 155

By WALTER E. TRAUFFER

South's First Sea Water Magnesite Basic Refractory Plant

H. K. Porter Company's Pascagoula, Miss., operation makes periclase and other refractory materials from dolomite, sea water, and chrome ore

ANOTHER ON THE SPOT report

WHEN the Refractories Division of the H. K. Porter Company, Inc., put into operation its new sea-water magnesite plant at Pascagoula, Miss., this was a major step forward in the utilization of our most abundant natural resource. This plant began producing periclase grain in December, 1958. The adjacent plant for the manufacture of refractory brick and specialties went into operation in March, 1959. Together they form the South's first fully integrated basic refractory facility for the exclusive production of periclase and other refractory materials. Completed at a cost of $12,000,000, the Pascagoula works rounds out the Refractories Division's products by adding a complete basic line to existing fire clay, mullite, alumina, and silica refractory products.

There are two major activities at this plant: the production of periclase from sea water, with the simultaneous processing of chrome ore; and the conversion or manufacture of these materials into brick and other refractory forms. An important part of this operation is the precise, highly automated control of every production step.

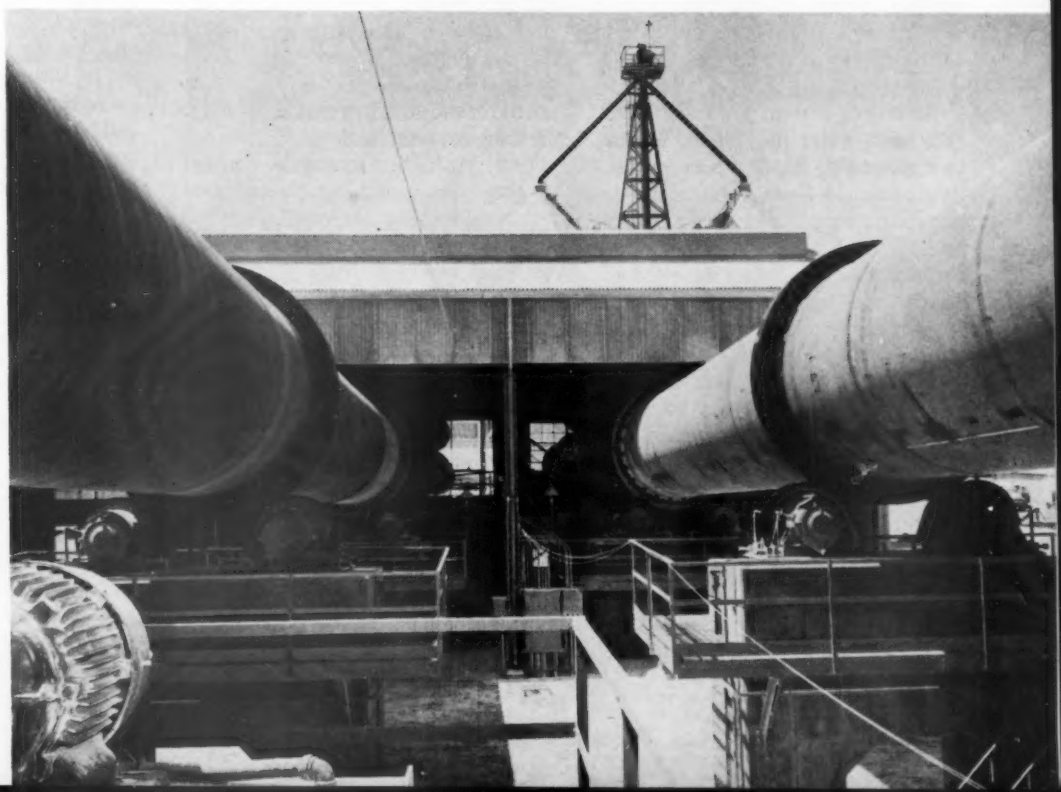
In the chemical plant section magnesia is drawn out of sea water and dolomite stone and converted to dead-burned periclase at the maximum rate of 125 tons per day. To accomplish this, the extraction system processes 13,200,000 gallons of sea water daily.

In the brick plant section the periclase and chrome ore are ground, screened, mixed, formed, and bonded into brick and refractory specialties, at a rated capacity of 80,000 tons per year.

This plant was designed and built

Left:
THE CONSOLE AND PANEL which control the automatic batching system for blending periclase, chrome ore, and additives for brick manufacture.

Above:
AN AERIAL VIEW of the H. K. Porter Company's sea water magnesia plant at Pascagoula, Miss. In the foreground is the chemical plant section, with the premix, clarifier, thickener, and reactor tanks and lime, caustic, and periclase (dead-burned magnesia) kilns. Stone storage is at the right, and the brick plant and dock in the background.



Right:
THE FIRST KILN (at the right) calcines dolomite for eventual reaction with sea water. The caustic kiln (left) is the first stage of double-burning to produce periclase.

THE DOLOMITE ROCK STORAGE SYSTEM, with the crushing- and screening station in the foreground. The conveyor to the processing plant is at the left.

by the Austin Company in co-operation with the Porter staff.

The recipe for producing a basic refractory brick, reduced to its simplest form is: react sea water with dolime, wash with fresh water to purify, and burn to high temperatures; then add chrome ore. This results in the tough linings that withstand the white-hot temperature of open hearths and other steelmaking furnaces.

In this operation both sea water and fresh water play added important roles. For the first time, refractory bricks in large volume are being shipped by water to Pittsburgh mills. Barges loaded at Porter's own dock at Pascagoula are handled by deep-water tugs through the Gulf of Mexico to New Orleans. There they become a part of a tow up the Mississippi River to Cairo, Ill., and then up the Ohio River to Pittsburgh. The 2,280-mile water trip takes about three weeks, but the freight cost is about 36 percent less than by rail.

CHEMICAL PLANT

The raw materials used in the sea-water magnesia process are dolomite and sea water, with natural gas as fuel. The sea water is pumped in from the deep-water channel on which the plant dock is located. It contains the equivalent of about 1.70 grams per liter of magnesium oxide. The dolomite stone used is a magnesia-type limestone averaging 38 percent magnesium compounds and 61 percent calcium compounds. As this stone is used as a precipitant in the process to cause the magnesium salts in the sea water to form magnesium hydroxide, its magnesium content is an important addition. A higher magnesia content in the stone would not be desirable as the advantage of employing the relatively cheap sea water as a raw material would then be lost.

For every pound of periclase produced, approximately 55 gallons of sea water must be processed. The daily capacity of 125 tons of periclase requires processing of about 13,200,000 gal. of sea water, 720,000 gal. of fresh water, and 342 tons of dolomite.

Stone Processing Raw dolomite stone is shipped by rail from the Birmingham, Ala., area and is dumped from the hopper-bottom cars into an under-track hopper. A belt conveyor and bucket elevator feed this stone (usually minus 1¾-in. but sometimes up to 4-in.) to vibrating screens with 2½- and 1½-in. openings. Any oversize goes to a Kennedy-Van Saun gyratory crusher and back *via* the elevator to the screen. Either of the two sizes can go direct to process while the other goes to storage *via* a horizontal stockpiling conveyor.

A traveling tripper discharges to stockpiles having a total capacity of 10,000 tons. Both sizes and some raw rock are stored separately. Front-end loaders can reclaim the raw rock back to the main receiving hopper for crushing. The reclaiming conveyor feeds *via* a second bucket elevator to a belt conveyor direct to storage tanks. These discharge to a pair of kiln bins, 350 tons each.

No. 1 Kiln Syntron vibrating feeders discharge from one bin, or both, to a bucket elevator to the kiln feed hopper. A Merrick Feedoweight controls the rate of feed to the No. 1, or dolomite burning kiln. This is a 9- by 300-ft. F. L. Smidth rotary kiln mounted on five tires and having a slope of ½ in. per ft. It is driven at the rate of 60 r.p.h. by a 75-hp. motor.

This kiln is lined with H. K. Porter's Spallac 70 percent alumina in the burning zone, 40 percent alumina in the intermediate zone, and Wallac kiln blocks in the heat exchange zone. Temperatures are 2,300 deg. F. in the burning zone and 850 deg. at the feed end. Kiln gas goes *via* Buell cyclone collectors to a steel stack. Capacity averages 400 tons per day, with a natural gas consumption of 7,300 cu. ft. per ton.

Lime is discharged from the attached Unax cylindrical coolers at a temperature of 200 deg. F. A belt conveyor carries it to a bin in the reactor department, where it is discharged to a Jeffrey Type A hammermill. Minus ¼-in. dolime goes

to a surge hopper from which it is measured by a Feedoweight onto a belt conveyor to the reactor tank; here it is combined with the sea water.

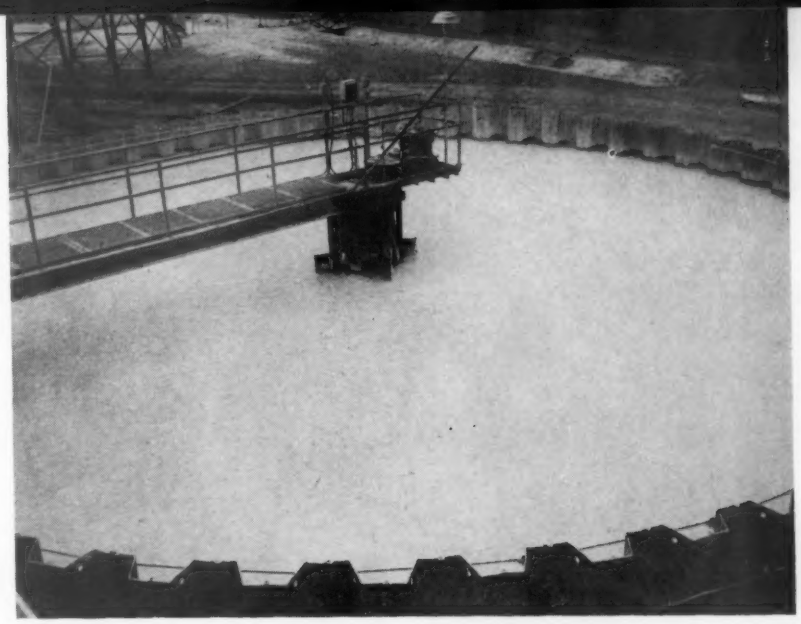
A feeder diverts any desired amount of the dolime to the premix tank in the sea water flow for water softening. This lime is first slaked and then passed through a rake classifier. Oversize sand goes to a Hardinge ball mill and back to the rake. Overflow from the rake is pumped into the premix tank.

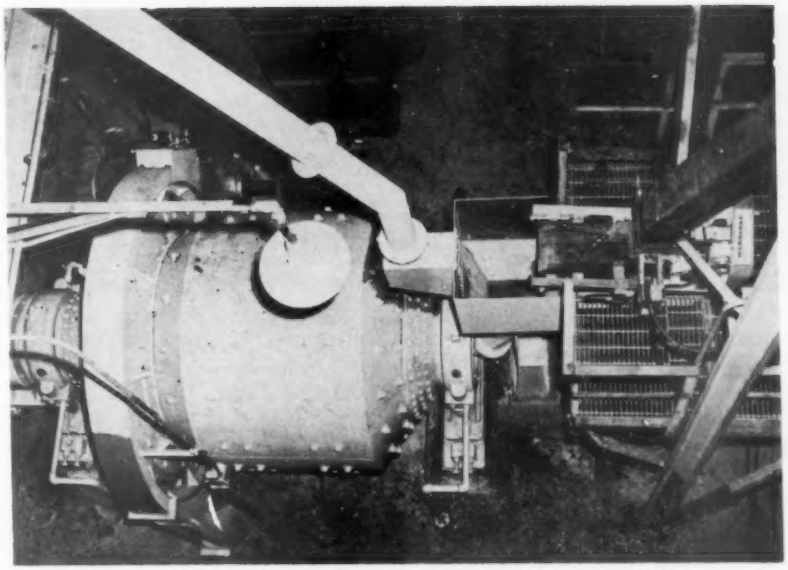
Sea Water Processing Sea water used in this plant is pumped from the Gulf of Mexico at the end of the 650-ft. wharf at a rate of 9,600 g.p.m. It is actually drawn from the bottom of a 30-ft. deep channel as the concentrations of salt and magnesium increase with the depth. The magnesium content is 1 lb. in 50 gal., with very little variation. The water is pumped to a 60-ft. diameter premix tank. This tank and the following ones are all by Process Engineers and have revolving rake mechanical agitation. At this point dolime is added for water softening.

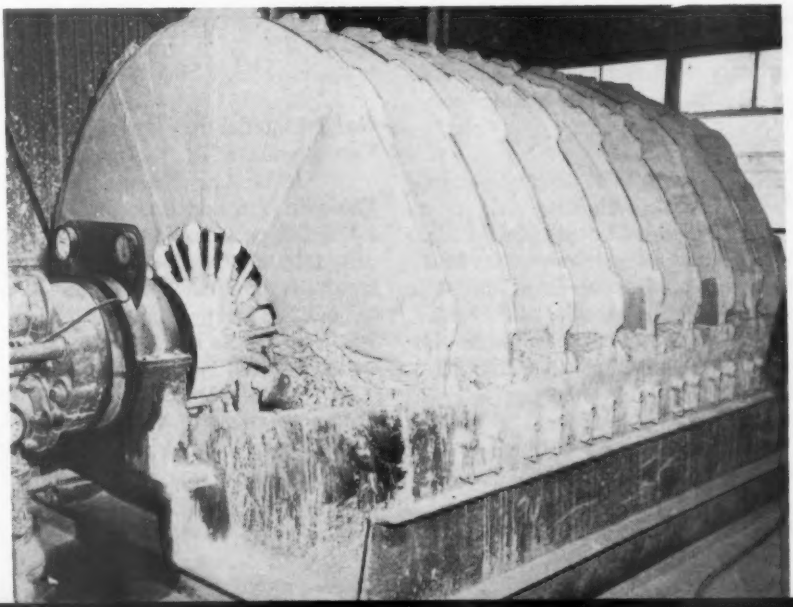
The water is then pumped to the 150-ft. diameter clarifier tank. Carbonates are precipitated out as a sludge and pumped to a waste pond.

Overflow from this tank is magnesium chloride and flows by gravity to the 60-ft. diameter reactor tank. There it is blended and mixed with the dolime to form magnesium hydroxide.

Overflow flows by gravity to the 300-ft. diameter primary thickener. Overflow from this tank is spent



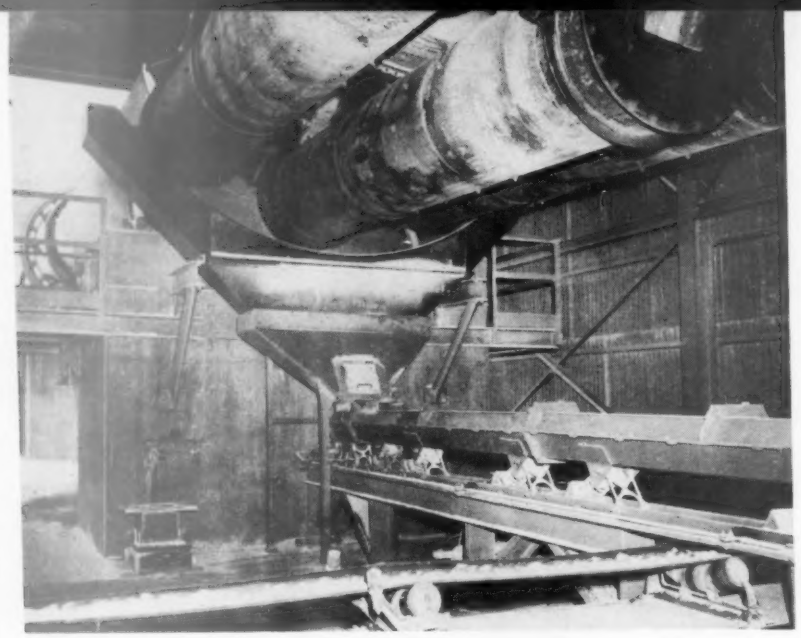




Top:
THE 60-FT. DIAMETER REACTOR TANK, with its mechanical agitator, in which sea water and dolomite, in the form of dolime, are first combined.

Middle:
ONE OF THE TWO CONICAL MILLS in this plant which reduces oversize in dolime and the chrome ore used in the brick plant.

Bottom:
ONE OF THE TWO DISC FILTERS which reduce moisture in magnesium hydroxide before it is fed to the No. 2 kiln.



THE NO. 3 KILN, with attached coolers, from which periclase is carried on an oscillating conveyor to the brick plant.

sea water and is allowed to flow back into the Gulf far enough out so that there is no chance that it will return to the intake. Its underflow—20 percent solids—is pumped to the 150-ft. diameter washing tank, which acts as storage and further thickens the slurry to 25 percent solids. Slurry from the washing tank normally goes to a feed box, where fresh water is added, and then to a second washing tank—150 ft. in diameter. Its contents can be recirculated if desired.

The 20 to 25 percent solids slurry from the second washing tank is pumped to a pair of Dorr-Oliver filters with 12 discs of 11 segments each. The resulting magnesium hydroxide cake is 50 percent solids and is fed from a slurry tank to an Oliver diaphragm pump. Overflow from the filters is returned to the primary thickener tank for recovery of its magnesium hydroxide content.

No. 2 Kiln The No. 2, or first-stage, caustic calcining kiln is a 9½- by 11- by 256-ft. F. L. Smidth unit. It is mounted on four tires, has a slope of ½ in. per ft., and is driven at the rate of 30 r.p.h. by a 75-hp. motor. This kiln is lined with the same type of H. K. Porter Co., Inc., brick as No. 1 kiln.

Temperatures are 2,350 deg. F. in the calcining zone (Radiamatic optical pyrometer) and 800 deg. at the feed end. Kiln gas goes *via* Buell cyclone collectors to a steel stack. Caustic magnesia is produced at a capacity of over 100 tons per day, with only a small amount of hydroxide. Natural gas consumption is about 11,000 cu. ft. per ton.

The magnesia is discharged from the attached Unax coolers at a temperature of 300+ deg. A Link-Belt oscillating conveyor, a belt conveyor, and a bucket elevator feed to a 100-ton briquetting feed bin for the dead-burned operation. A Syntron vibrating feeder and screws feed to the hoppers of the two Komarek-Greaves briquetting presses. These mold the product into the desired small oval-shaped grains, which are then elevated to a bin. An Allis-Chalmers one-deck screen returns the minus ¼-in. material to the briquetting feed bin.

No. 3 Kiln Material over the screen goes into the No. 3 kiln, an 8- by 180-ft. F. L. Smidth unit. This kiln is mounted on three tires; it has a slope of ½ in. per ft. and is driven at 30 r.p.h. by a 40-hp. motor. It is lined with Porter's 9-in. basic Kilmag brick backed by 3-in. Spallac kiln blocks in the burning zone. This lining has given excellent results, having been in operation for over 1½ years with very little evidence of wear or even spalling. Intermediate and preheat zones are lined with 70 percent and 40 percent alumina rotary kiln blocks.

Temperatures are 3,200 deg. F. in the calcining zone and 1,000 deg. at the feed end. Kiln gas goes, *via* dust collectors and fans, to a steel stack. A water spray is used in the feed end of this kiln to hold down exit gas temperature. Capacity averages over 100 tons per day of dead-burned magnesium oxide or periclase grain. This kiln is fired with a Peabody burner, using about 4,500 cu. ft. of natural gas per ton.

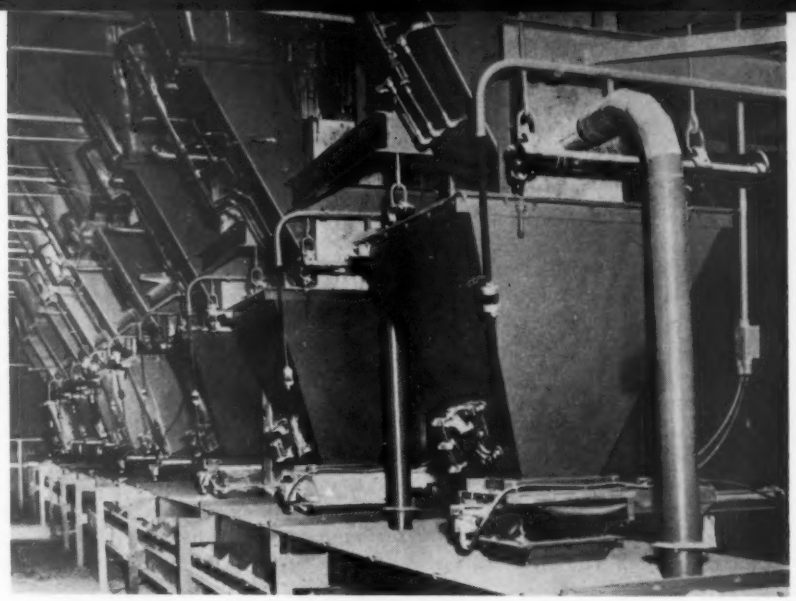
The calcined periclase grain is discharged from the attached Unax cooler at a temperature of 450 deg. onto a Link-Belt oscillating conveyor. A belt conveyor with Thermoid silicone Dacron high-temperature belting carries this material to the periclase storage bins.

BRICK PLANT

Chrome Ore The brick plant is fed in two places, with chrome ore and periclase. The Philippine chrome ore is received in ships at the plant dock, which can accommodate vessels of up to 10,000-tons capacity. Handling and unloading is done by stevedoring companies. The ore is trucked to ground storage at the plant, an area consisting of a 250-ft. square floating concrete pad on filled ground. This pad is raised 18 in. at the center, so that when it is under the full 30,000 ton load, it is flat.

Minus 4-in. ore is somewhat slabby. A Michigan front-end loader feeds this material to a 36-in. Allis-Chalmers jaw crusher which reduces to 2-in. minus. The ore then goes to a 4- by 36-ft. Hardinge Ruggles-Cole drier and to a 750-ton outdoor storage tank. A belt conveyor with a Merrick Weightometer feeds to a Tyler Niagara screen, from which the plus ¾-in. material goes to a Kennedy-Van Saun gyratory crusher in closed circuit.

Minus ¾-in. chrome ore goes to an 80-ton tank, from which it is fed to another Niagara screen. This



SOME OF THE 60 BATCHING BINS AND SCALES from which periclase, chrome ore, and additives are automatically blended.

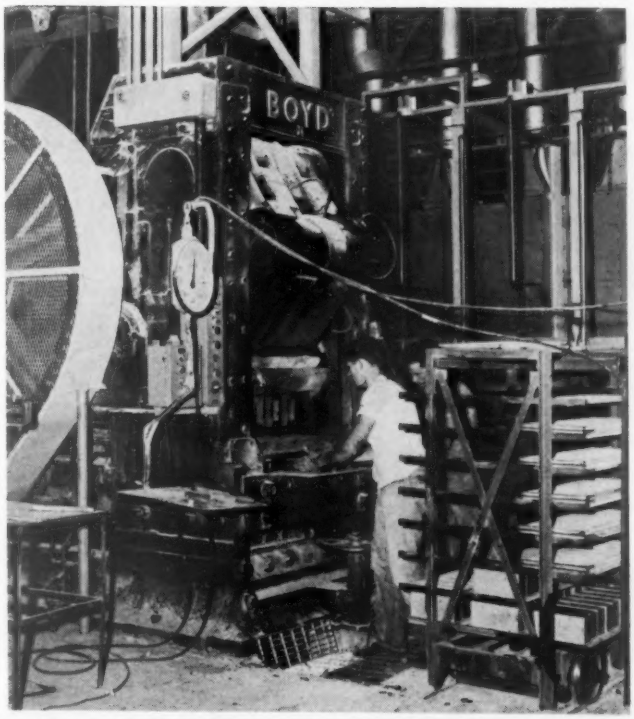
unit makes a ½-in. separation, the oversize going to an Allis-Chalmers smooth-roll crusher in closed circuit. Undersize again goes to a tank feeding a Tyler Hum-mer screen which makes a .175-in. separation with another smooth-roll crusher in closed circuit.

All of the crushers have feed hoppers, and all of these have Syntron feeders except that for the jaw crusher. The .175-in. minus chrome ore goes to the classifying circuit, including five Hum-mer screens, which can make six fractions ranging from ½-in. down to 100-mesh, depending on the desired mix. A Hardinge conical mill is available for reducing to any desired sizes, but it is seldom needed.

All fractions over 40-mesh are passed over air flotation tables to get rid of any native wood particles in the ore. The various sizes of ore go to as many as necessary of 30 of the 25-ton batching bins. (There are 60 in all.) Never less than two bins are used for one size, and material is never fed to a bin being batched out in order to prevent segregation.

Periclase Periclase grain is stored in two 1,400-ton outdoor tanks. The flow here is the same as in the chrome processing department, excepting the primary crusher and one of the two rolls. There is a Hardinge conical mill, in closed circuit with a Hardinge mechanical separator, which is used much of the time for fine and intermediate grinding. Any desired six fractions, from ½-in. down to 100-mesh, can also be made. The other 30 of the 60 batching bins are used for periclase.

Both In each of the departments there is a Raymond whizzer separator in the screening circuit which is used in making very fine sizes. Each department also has a Pangborn bag-type collector, and the collected dust also goes to the separator. Each conical mill is controlled by an electric ear.



ONE OF THE TEN PRESSES that form the brick, which are transferred to the rack cars (right).

Each department (in the chrome, from the drier on) is controlled by an operator at a panel. Interlocking is by sections, and all buttons, switches, etc., are color-coded.

All additives are received in bags by rail and are elevated into some of the 60 batching bins. Included are floated clays, cements, and other miscellaneous binders for specialty items.

Batching The 60 batching bins holding the various grain sizes of periclase, chrome ore, and additive materials are controlled by one man at a batching console. This panel is the starting point of the Howe Batchmaster automatic batching system. From this point, the batch weighings are initiated and the mixes are sent to the proper mixers. With the proper formula—specified by the laboratory—set on

the digital indicators, a pushbutton at the console starts the proper materials feeding into weigh hoppers. The panel automatically controls the feed to produce the correct weights, then scans and checks the weighing systems to insure proper formulation according to mix.

There is a dial scale under each pair of bins; and the scale hoppers range from 100- to 1,000-lb. capacity. All scales must be at zero before the system will operate. When activated, the bins discharge fast and then dribble, and there is automatic compensation for free falling material. The scale then goes into an automatic check cycle; and if the weight is not inside the established tolerance, it will not dump.

When this happens, at rare intervals, a helper on the scale floor, alerted by telephone, adjusts the weights to compensate. The operator then pushes the button to dump the scale, and the blended mix is discharged on a reversible belt conveyor. Traveling in one direction, the belt leads to the specialties production area; in the other direction it goes to brick production. For brick, it discharges to one of two Simpson Muller type mixers.

Brick There are two batch lines and two mixers — one for high-periclase brick and one for high-chrome brick. Each mixer goes through a pre-set time operating cycle for addition of water, mulling, etc., by means of National Engineering Timemaster control. The mixes are automatically discharged to monorail buckets and thence to the presses. The buckets are automatically filled, delivered, etc. A waste recovery system under each line feeds back to the mixers.

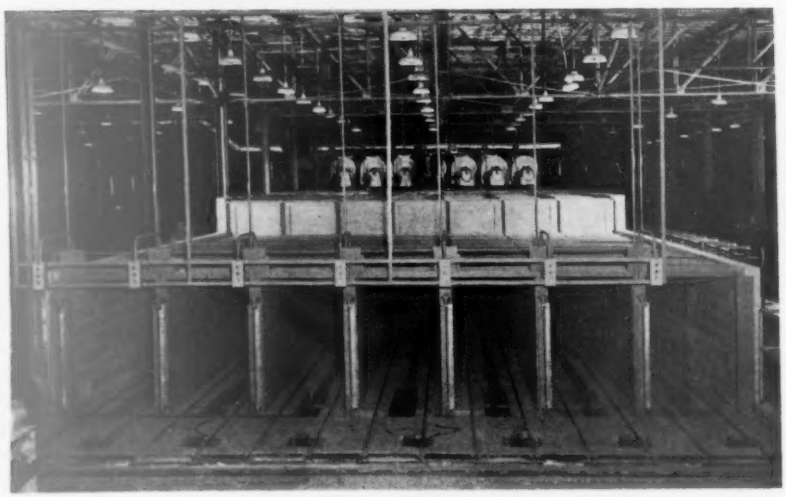
In each line there are four heavy-duty presses—two Boyd and two International Clay Machinery—and a small Boyd press. The formed brick are loaded onto rack and pallet cars and taken to the 7-tunnel, 120-ft. long Swindell-Dressler waste-heat dryer. Waste heat from the tunnel kiln maintains a temperature of 250 to 300 deg. F. on a 24-hr. cycle. At this point, brick made to chemically-bonded specifications—about one-half of the total —are completed and withdrawn from the production line to pallets for shipment or for the metal cladding machine.

The other brick are transferred to kiln rack cars and taken to the 278-ft. long Swindell-Dressler gas-fired tunnel kiln. The temperature varies from 2,800 to 3,100 deg. F., depending on the number of cars pushed per day, which in turn depends on the demand and the type of brick. The retention time varies from 2½ to 7 days, depending on the number of cars pushed per day. The finished burned brick are removed from the cars to pallets for shipment or for the metal cladding process.

Either type of brick can be metal clad, but this operation applies mainly to the chemically-bonded brick. Metal cladding steel sheet is received in rolls and already slit. A stamping press punches relief holes at the corners and puts in dimples to take care of expansion. Finished brick are loaded on wooden pallets on roller conveyors, covered with waterproof paper board, and bound with Acme Steel straps.

AT THE SECOND STRAPPING STATION a single operator puts three cross straps around a box of brick which has already been longitudinally strapped.

THE 7-TUNNEL WASTE-HEAT DRYER through which all brick are passed, the chemically-bonded units to stack, and the others to the tunnel kiln.



Specialties The reversible conveyors from the batching system feed at their other ends to the specialties department. There the dry specialties go to a Worthington Mixer or blender, along with additives, and then to an automatic bagging machine which fills 75- and 100-lb. bags.

Wet specialties are made with Rhodesian chrome ore, which goes through the same processing flow

(*Concluded on page* 89)

Virginia Plant's Twin Feed Systems Provide Steady Material Flow

At the Chester, Va., plant of Southern Materials Company two different methods of feed, and full-time operation of two excavating and rehandling machines are involved in maintaining a steady flow of material into the operation. The two feeding methods include, in one case, rehandling of dredge-run sand and gravel from barges into a plant feed hopper; and in the other, wet-pit excavation, followed by truck haul to a feed conveyor system.

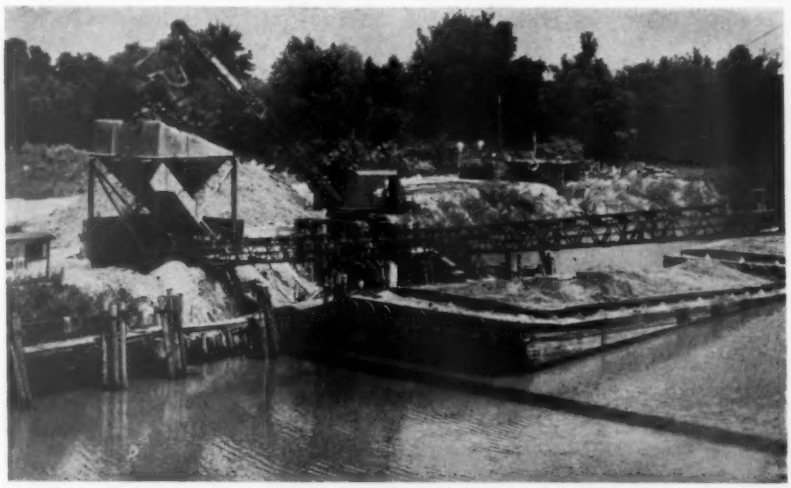
In the first operation, dredged material is barged to a point on the bank of a canal near the plant site. A string of about four 750-ton barges are handled at a given time, and are spotted for unloading by winching along the bank. A 3-cu. yd. Manitowoc 3500 machine fitted with a clamshell bucket then unloads directly from the barge, through a 90-degree swing, into a plant feed hopper, from which the material is conveyed to the plant. The clamshell rig unloads about five barges during a 10-hour shift; and in a period of 16 months it has handled about 1,400,000 tons.

An identical 3-cu. yd. machine, fitted as a dragline, operates in a wet pit on a 500-acre tract of sand and gravel. The excavating site is close to the plant, involving a round trip haul distance of about one-half mile. The dragline is digging in depths ranging from 5 to 70 ft., and loads 12-cu. yd. tractor-trailer haul units for transport to a truck hopper and conveyor system feeding the plant. Up to seven of the haulage units are used in normal operation.

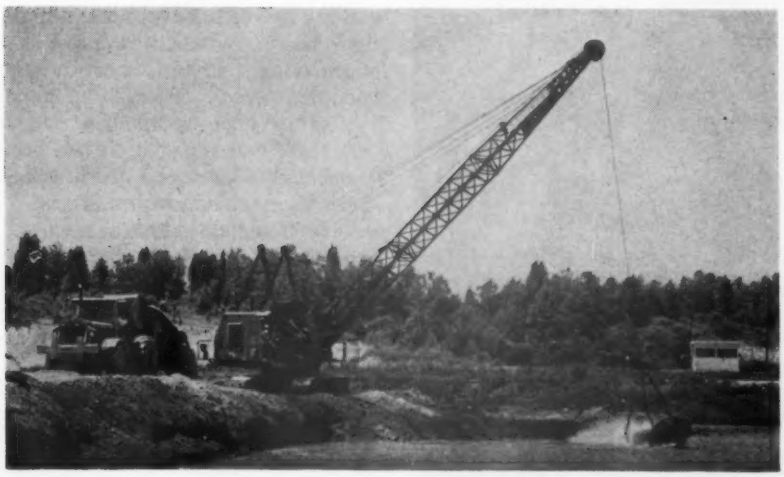
Loading time for each truck is about three minutes, and about 200 loads, or 2,400 cu. yd., are excavated and transported to the plant during a 10-hour shift. In 3½ years, the dragline has handled about 2,700,000 cu. yd. of material from the wet pit. The unit, now rigged with a clamshell, also previously worked in the same pit as a dragline; and in two years it removed over 1,500,000 cu. yd. of sand and gravel.

Over-all operations of the pits and plants at Chester are under the direction of L. C. Immerson, superintendent.

CARL OTTO ANDERSON, 65, president of the Ozark-Mahoning Company, Tulsa, Okla., died in a hospital in that city after having suffered a stroke at his office. He had been president of Ozark-Mahoning since 1953. Mr. Anderson became associated with the firm 35 years ago, when he was placed in charge of research. He became vice-president of the firm in 1947.



Above: Dredged material is barged to this point, and a 3-cu. yd. clamshell unloads sand and gravel from the 750-ton barges, discharging directly to the feed hopper of the second plant feed system. About five barges are unloaded during a 10-hour shift.



Left: In the wet-pit operation, a 3-cu. yd. dragline excavates at depths from 5 to 70 ft., and loads 12-cu. yd. haulage units in which pit-run material is transported to a truck hopper and conveyor system feeding the plant.

Belt Conveyors Replace Trucks For Long, Steep Hauls

◆ U.S. Borax completes changeover– Riverside Cement has similar plan

By HARRY F. UTLEY

The new crusher station at the tail end of the belt conveyor at the bottom of the pit. High crushing capacity is attained with the big (54- by 70-in.) swinghammer crusher.

ANOTHER ON THE SPOT report

IN the Mojave Desert, near Boron, Calif., ore is being mined from the world's largest known deposit of sodium borate at the plant of the United States Borax & Chemical Corporation.

U. S. Borax & Chemical's Operation For about 30 years, mining operations were carried on underground by the room-and-pillar system. For a long time, however, management had realized that an open pit would afford numerous advantages over the underground mine. Recovery was relatively low due to the need for large pillars (with ore left in place) to support the weak shales surrounding the deposit.

In October, 1955, a definite decision was reached to convert from underground to open-pit operations. One of the paramount problems had to do with the method of transporting the borate ore from the pit to the surface.

After a detailed study, management had reduced the problem to a choice between (1) truck haulage and (2) belt-conveyor transport. Further examination revealed that both systems could economically be adopted—trucks during the initial phase of open-pit mining, and a conveyor belt after the pit had been sufficiently developed to justify a permanent conveyor installation.

The tremendous task of removing up to 250 ft. of overburden and exposing the ore in the new pit, which covers an area about 900 by 1,400 ft., required about two years. Open-pit mining operations were started in 1957. A careful study indicated that an initial period of 3 years of truck haulage to bring the

An aerial view of the big open-pit mine at Boron, Calif., showing the new belt conveyor installation. Haul roads formerly used by the trucks may be seen spiraling up the sides of the pit. The processing plant is in the distance.

ore to the crusher at the surface would be desirable; this phase was to be followed by a change to a conveyor system, with the primary crusher placed in the pit.

This timetable has been adhered to, and the long belt conveyor went into service in January, 1961, some nine months after construction was started. The system was designed by the U.S. Borax engineering department in Los Angeles, in co-operation with the Boron mining department.

With the advent of open-pit mining in 1957, the ore was drilled, blasted, and loaded into trucks, which spiraled up the haul road for a maximum distance of 2½ miles to the primary crusher at the surface. This method continues unchanged, except that trucks now merely deliver from the electric shovels on a short haul to the receiving bin of the new hammermill at the crusher station within the pit.

The conveyor can deliver as much ore in 3 hours as the trucks did in 8. It provides great flexibility and greatly reduces the cost of transporting the ore. It is estimated that over a 15-year period the savings will produce a return on the investment in the range of 20 percent. There is also a much greater factor of safety with the belt in operation, since it reduces the number of man-hours of exposure, particularly in the operation of the trucks on the adverse grades.

Trucks now discharge into a 90-ton bin at the new crusher station. Portability was a factor in the design of the station, which can be

The head frame of the new belt conveyor at Boron, which houses the automatic tensioning equipment. Ore is transferred to the stacker belt system via chutes (left).

A closeup view of the new crusher station in the pit, with the 1,300-ft. long belt conveyor running on an 18-degree incline to the surface. The belt carries as much ore in 3 hours as trucks were able to deliver in 8 hours on their tortuous 2½-mile climb up a spiral haul road.

moved to another location in the pit to reduce truck-haulage distance as required, without too much expense.

A 72-in. pan-feeder transfers the ore from the bin to the crusher, a 54- by 70-in. Jeffrey hammermill. This new crusher has a capacity approximately 85 percent greater than the old surface crusher which was supplied by the trucks coming up the spiral haul road. The crusher product discharges onto a 60-in. wide belt feeder, which delivers to the 42-in. by 1,300 ft. belt running on an 18-deg. incline to the head section up on the lip of the pit. The vertical lift is 315 ft. Dust arising at the crusher and tail section is suppressed by a cyclone collector and a suction fan. Coming off the head-pulley end, the ore is transferred to a stacker conveyor which builds stockpiles to supply the processing plant nearby.

In order to maintain a constant 18-degree slope on the conveyor, a 10- by 115-ft. Armco Multi-Plate corrugated metal tunnel was placed under a section of the haul road about half-way up the incline out of the pit.

The Goodyear conveyor belt is ¾ in. thick and has five plies of to withstand tension of 44,000 lb. The tension is varied in operation, however, by the use of an electric tensioning device at the head-house, which automatically adjusts tension as the load varies. This take-up system eliminates the need for cables, counterweights, etc., such as are employed in conventional belt-conveyor systems. Maintaining constant maximum tension is thus obviated, and only the tension needed is applied, a factor that is expected to prolong the life of the belt greatly.

Troughing rolls, spaced 4 ft. apart, are angled at 30 degrees instead of the conventional 20 degrees. The resulting increase in carrying capacity is calculated at 27 percent. A penetration-detection device automatically stops the conveyor if the belt should be punctured.

Control of the entire system from pit crusher to stockpiling at the surface is a one-man operation, fully automated and electrically interlocked to prevent pile-ups at transfer points. Another interesting phase of control involves the use of closed-circuit television. One TV camera is focused on the general stockpile area and another on the transfer point at the head end. Monitors in the pit thus enable the operator to move the stacker by remote control when necessary, or to halt operations if trouble should occur at the transfer point.

It has been nearly 80 years since Pacific Coast Borax (one of the predecessor companies of the present U.S. Borax & Chemical) made history when it began sending its famous 20-mule-team wagon trains across Death Valley in California. The new conveyor system, while less romantic and dramatic, perhaps, is an outstanding achievement in the transportation of borate ore.

Riverside Cement's Operation A strikingly similar situation exists in the experience and planning of the Riverside Cement Company. Riverside started production from its new room-and-pillar limestone mine at Crestmore, Calif., in 1955. Haulage of stone from the first level, 330 ft. up to the primary crusher at ground level, is by electric-powered trucks.

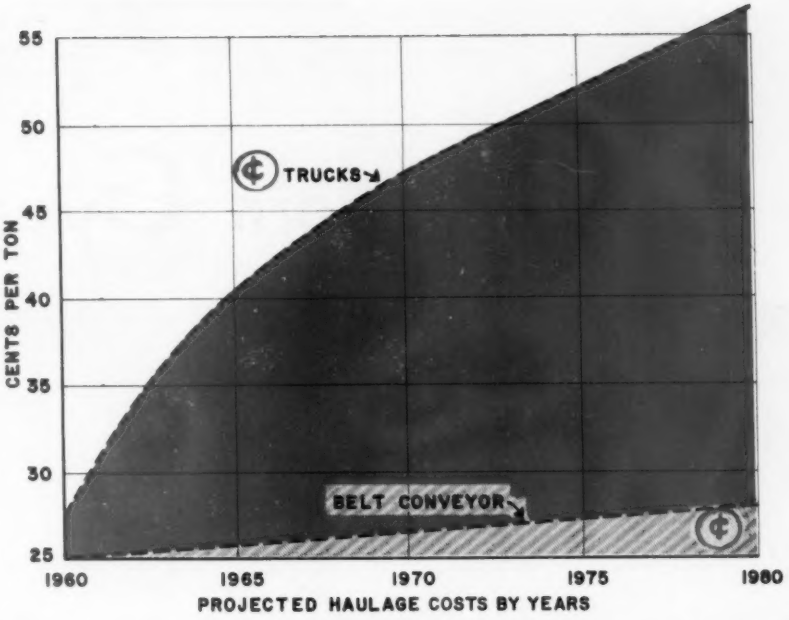
These trucks carry a 25-ton load up a 10 percent grade at 10 or 12 m.p.h. At the time mining operations were planned, it was realized that the haulage system would have to be changed in order to maintain production from the deeper levels.

Much experience has been gained, and cost data have been accumulated during the last five years of operation with the trucks.

Time studies of present operations enable management to predict production capabilities of the haulage system from future levels and the additional truck units required by that system to meet production needs. As the mine goes deeper, stone transportation costs will apparently get far out of line if truck transport is retained. In searching for the lowest cost haulage system, preliminary studies were made of the following plans:

1. Underground crusher and belt conveyor to surface, using present trucks to haul to the crusher.
2. Underground crusher and high-speed electric bottom-dump trucks and trailers to haul stone to the surface.
3. Skip hoist in an inclined shaft.
4. Vertical shaft and hoist.

A combination of belt conveyor and underground crusher installation turned out to be the best of the four methods considered, when operating cost, flexibility, capability of expansion, and capital expense requirements were all considered. A comparison cost curve for the belt system *vs.* the trucks is shown in the accompanying graph. These curves were plotted to show the total cost per ton at the predicted production rate for the years to 1980.



A comparison: anticipated truck haulage cost vs. belt conveyor transport cost as operations go deeper in Riverside Cement Company's Crestmore limestone mine.

Present plans call for the installation of a belt conveyor in four separate flights on an 18-degree slope, in order to get through the caved area and old mine workings. Work on driving the first raise is now under way. Total lift will be 740 ft. Capacity will be 400 t.p.h. average, and 550 t.p.h. peak. Development is being planned so that long, straight belt runs will be possible.

Basic Refractory Plant

(*Concluded from page* 84)

as the Philippine ore. It is mixed and blended with additives and loaded into metal drums or burlap bags.

GENERAL

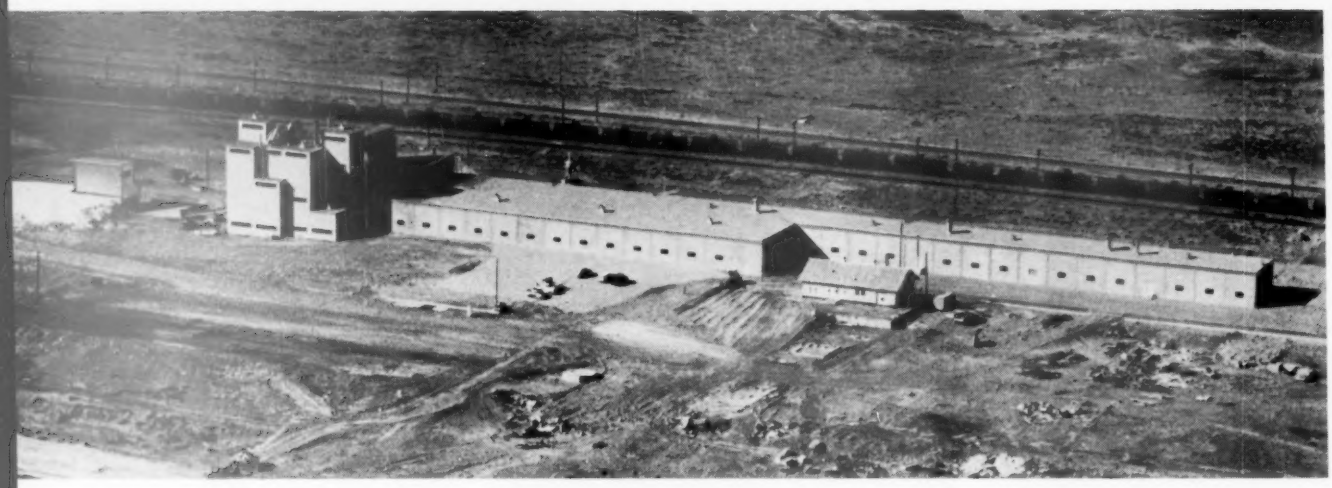
Quality Control The automatic and accurate processing and blending throughout this plant assures a quality product at the lowest possible cost. Further assurance lies in the quality control program. Operating around the clock is a group of chemists, engineers, and technicians whose sole responsibility is the quality of raw materials, processing, and products. In completely equipped chemical and physical laboratories, this team constantly weighs, measures, examines, analyzes, and tests all raw materials, processing steps, and products of the chemical and brick plants. This team works closely with the production department.

Products This plant produces a wide variety of chrome and/or periclase refractories, including basic castables; gun mixes; mortars; dry and plastic mixes; special grinds and mixes; several varieties of basic brick, including clad; cements; fire brick; furnace linings; glass industry refractories; and brick.

Other Refractories division personnel includes J. P. Raugh, vice-president and general manager; Ray Conover, general works manager; and Ralph Rose, basic products manager. At the Pascagoula plant, R. G. Vervaeke is works manager, J. G. Bartel is general superintendent, Gilbert Ewing is general foreman of the sea-water department, and Dale Campbell is general foreman of the brick department.

Capacity of the Virginia-Carolina Chemical Corporation's plant in Nichols, Fla., has been increased by 400,000 tons annually of calcined phosphate rock. Included in new equipment and systems recently added are a 10- by 160-ft. rotary kiln; closed-circuit television; automation; and remote control of feed, temperature and draft, and firing rate.

Big Horn Gypsum—



New Wyoming Enterprise

▲ "Peak of Quality" motto backed by automated plant producing gypsum wallboard

WHEN Big Horn Gypsum Company began operations this spring in a new $3 million plant at Cody, Wyo., the venture brought a new industry into the state and started a new chapter in the record of a historic part of the old west.

The new gypsum wallboard operation, designed by Johnson & Johnson Engineers & Architects, Inc. of Chicago, has an annual capacity in excess of 100 million feet of board products. Basic goals in the planning of the new installation were peak automatic operation efficiency, economical and sound construction, and the minimum of frills.

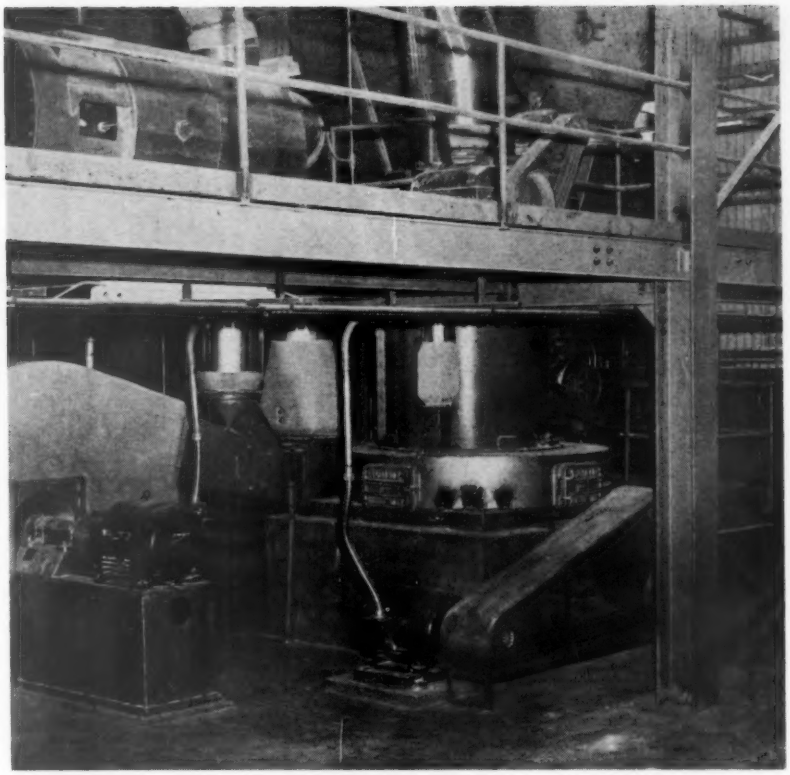
Construction was started early in 1960 by the prime contractor, Williams and Peterson Construction Company. By March this year the installation was complete and board production was under way. The main structure, 720 ft. long and 100 ft. from wall to wall in the widest section, was erected with tilt-up concrete panels. It houses a 524-ft. long Ehrsam board machine and a 558 ft. dryer line which contains a 278-ft. long 8-deck, 3-zone Coe Mfg. Co. dryer.

Adjoining the main building is the kettle mill with its milling, calcining, and auxiliary equipment. Close to this structure, and linked to it by raw material handling conveyor, is a crusher house and plant feed hopper.

The operation, in addition to incorporating all of the latest ideas in gypsum board production in a highly automated manufacturing system, is favored with an excellent source of raw material, and shipping facilities that permit the servicing of customers in 12 of the Northwest and Middle-West states by both truck and rail.

Approximately 41,000,000 tons of high purity gypsum are contained in the deposit from which the plant

Opposite Page:
THE OVER-ALL LAYOUT of the Big Horn gypsum plant at Cody, Wyoming. The long main structure was built of precast tilt-up concrete panels. It houses the board machine and the dryer line—both over 500 ft. in length. The taller structure at the left houses the gypsum milling and calcining operations—the small separate building (far left) is the primary crusher house.



ONE OF THE TWO ROLLER MILLS in which primary crusher-run gypsum is reduced to 96-98 percent minus 100 mesh prior to calcining. The mills incorporate integral separators, and the circuits are provided with flash drying and cyclones.

is supplied. It is located about seven miles from the plant site; the quarrying operations, plus haulage, are done under contract by the Taggart Construction Company of Cody.

As trucked to the board plant, the quarry-run gypsum has a top size of about 24 in. This material is dumped into the 30-ton plant feed hopper ahead of the primary crushing installation. The latter is comprised of a Hammermills Inc. hammermill and apron feeder that will reduce minus 24-in. rock to minus 1 in. at the rate of 150 t.p.h. —one of the outstanding operational features.

Discharge from the hammermill is received on a belt conveyor, followed by another belt and a bucket elevator with which the plant feed is transferred to a pair of storage bins. In lieu of having the bucket elevator discharge to a reversible distributing conveyor on the top of the two 300-ton steel storage bins, the elevator was built high to permit chuting directly to both bins without the necessity of an intervening piece of handling equipment, thus further reducing plant maintenance. Both bins are equipped with high-level Bin-Dicators.

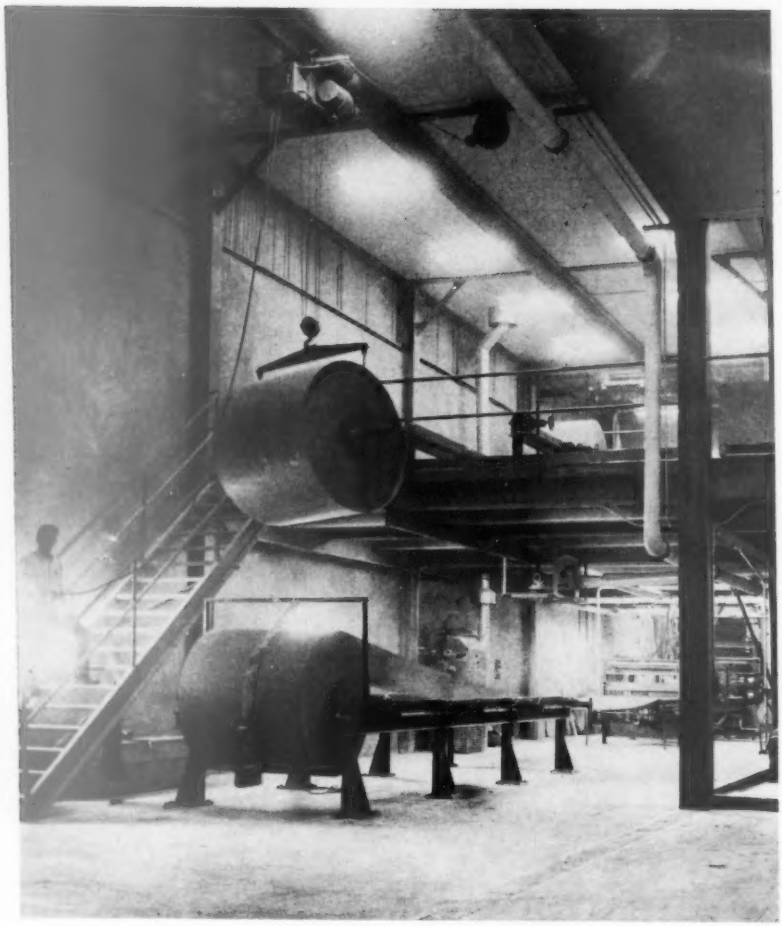
The above described handling system, and subsequent elevators and screw conveyors, were designed by Johnson & Johnson on the basis of past experience with this type of processing.

Draw from the gypsum rock bins is accomplished through 60-degree chutes that feed directly to a pair of Raymond roller mills with integral whizzer separators, and flash drying systems. Blowers and main drives of these units are served by 75-hp. motors. Products from the cyclones in the two milling circuits fall in the range of 96 to 98 percent passing 100 mesh, and each circuit is rated at 15 t.p.h. on that fineness.

From the cyclones, the ground gypsum passes through rotary valves to enter a distributing screw. The latter discharges into a pair of land plaster bins which have individual capacities of 75 tons. Each bin is equipped with high- and low-level Bin-Dicators; when full, a bin contains the equivalent of about 3½ kettle charges.

Feed from the bins to the following pair of 20-ton capacity Ehrsam calcining kettles is carefully regulated volumetrically, and is delivered by a twin screw conveyor in each system. The gas-fired kettles are 15 ft. in diameter, 22 ft. high, and have pneumatically operated butterfly discharge gates. Dust collection is handled by cyclonic stack collectors.

Calcined gypsum is discharged from the kettles into their respective hot pit. Below each pit are four emptier screws which discharge into a common collecting screw servicing both hot pits. The collecting screw,



A 10,000-FT. ROLL provides bottom paper entering the board machine (far right). On the plant mezzanine (upper center) another roll delivers paper for the upper, or finished, surface.

in turn, supplies a hot stucco bucket elevator that feeds a distributing screw for subsequent placement of the calcined material in surge bins of the board plant.

With the exception of the latter screw, all of the above processing and handling phases are housed in the kettle mill. Control of those milling and calcining operations is handled by one man from a central panel in the mill room.

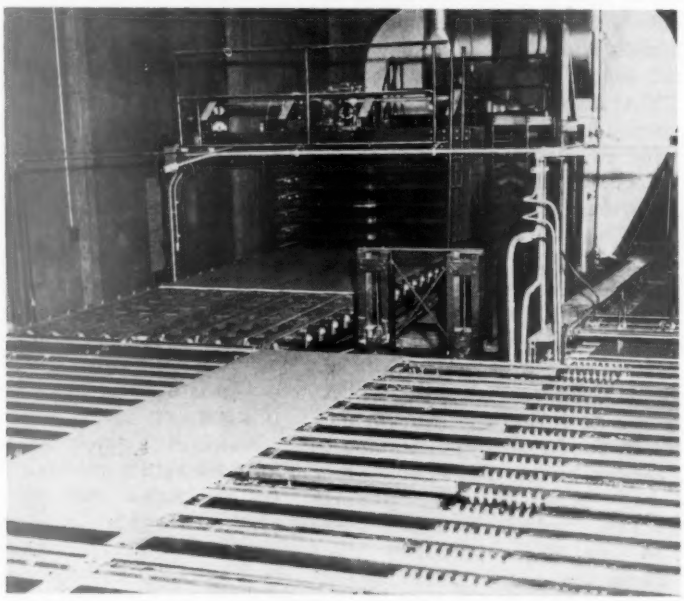
As received in the board plant via the distributing screw noted above, calcined gypsum is discharged into a pair of stucco bins. These are American-Marietta concrete stave units, of 300-ton capacity each.

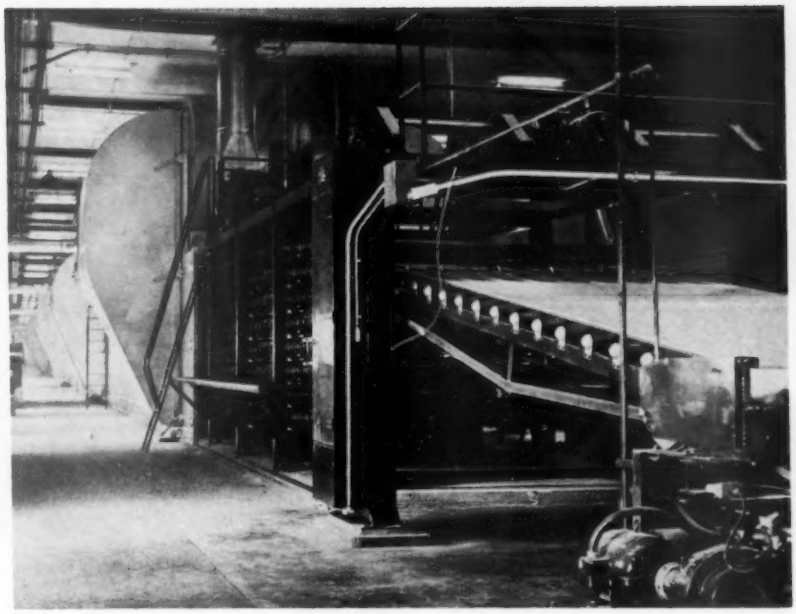
Another design feature involves the drawing of stucco from the bins via screw conveyors equiped with Varidrive motors. This variable speed operation permits remote control by the board machine operator of the amount to be drawn from the stucco bins. The two variable speed screws, each rated up to 15 t.p.h., discharge to a collecting screw that delivers the stucco to a bucket elevator. From the latter, the material is placed in a "live-bottom" bin which has related Howe scale weighing mechanism.

The amount of material in this bin regulates the speed of the screws below the stucco bins. At preset weights, the stucco is removed from the live-bottom bin via a measuring screw controlled from a panel at the board machine operator's station. Stucco is transferred from the measuring screw to a mixing screw into which various additives—ground gypsum block, starch, etc.—are introduced, and is delivered to the pin mixer of the board machine. Related systems terminating at the pin mixer include stock pulping, asphalt emulsion, and foam generation.

Mixtures are then fed from the

WET BOARDS leave the board machine (right) on a transfer system (foreground) and are delivered to the dryer (center).





A VIEW AT THE END of the 8-deck, 3-zone dryer. The feed section will handle two standard width boards, or multiples up to 24 ft. in length. Delivery of the boards onto the various decks is handled by the tipple (right).

mixer to the machine in the normal procedure of placement on the bottom paper on the machine. The Ehrsam board machine has a standard arrangement, including paper tensioners, guides, scorer, buffer, gluing spouts, forming rolls, setting belts, live roll section, cutoff knives, and accelerator section. Rated board line speed is 75 f.p.m.

Delivery of formed boards to the dryer is accomplished through standard transfer cross belts, transfer off rolls, turner, and tipple hoist, all of which were supplied, along with the main dryer installation and dry end system, by Coe Mfg. Co.

The 28-ft. feed section of the dryer will accommodate two standard width boards, or multiples up to 24 ft. in length. An auxiliary exhaust system is provided for removal of excess moisture originating from the wet boards entering the feed section. This prevents a buildup of condensation on the steel framing—which would drop on the boards, causing blemishes and defects.

Dryer rolls are driven through a Reeves variable speed transmission, and operated at speeds related to those of the board machine. The direct fired gas heaters are of the line burner type; at specified pressure and B.t.u. content of the natural gas available, they deliver 15,000,000 B.t.u./hr. in zones 1 and 2, and 10,000,000 B.t.u. to zone 3. The cooling section following the main dryer area is 32 ft. long to accommodate boards up to 24 ft. in length and to allow for a gap between successive boards.

Automatic handling of the board leaving the cooler section involves an unloader, dry end transfer, and lath cross conveyor. This operation always works at a rate exceeding delivery of board into the dryer feed section. From the converging area (where boards from all decks are brought out into a single line), both board and lath pass through a breaker section for separation at the perforation points.

STORAGE TRANSFER. After separation at perforations, and automatic booking into pairs, boards are transferred to storage or loading areas by forklift trucks.

Beyond the breaker are the dry end transfer and the lath cross conveyor for handling the respective product. The former delivers boards to an air-operated booking turner for automatic booking of each pair of 48-in. wide boards. Narrower widths are manually booked. Subsequent handling of the booked units to storage or loading is handled with a forklift truck.

Over-all operations of the Big Horn plant are under the supervision of W. C. Headlee, works manager. Officials of this impressive newcomer in the gypsum industry—and to that of Wyoming—include Sid H. Eliason, president (who was instrumental in the development of the Western Gypsum Company plant in Utah); E. L. Hildebrand, executive vice-president; S. H. Eliason Jr., treasurer; and M. B. Lewis, secretary.

Standard's modern office building also houses a laboratory, a "club room" with a kitchen, and a geological and end-product display.

Versatile Florida Sand Firm—

A Family Project

—

Officers of the company are: Mrs. George W. Phelps, president; and her sons, L. B. Carnes III, vice-president, left; and Gary W. Carnes, vice-president, right. R. W. Holden, secretary, is in the center.

Produces Wide Variety of Bulk and Bagged Sizes

By WALTER E. TRAUFFER

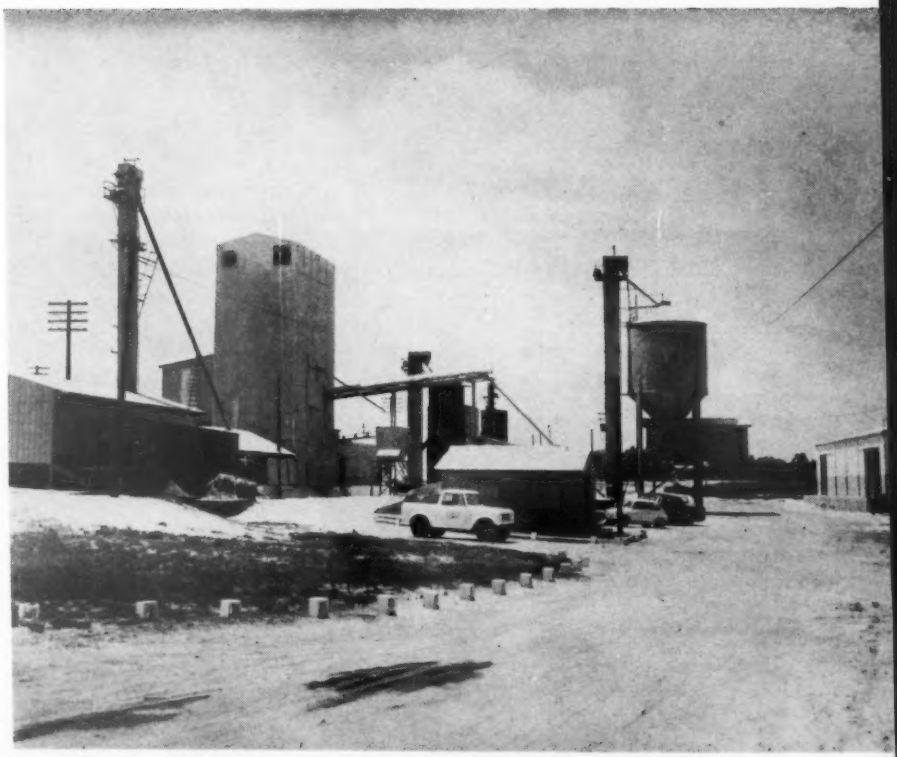
ANOTHER ON THE SPOT report

THE Standard Sand and Silica Company of Davenport, Fla., conducts one of the largest and most versatile silica and specialty sand operations in the state. With two washing and classifying plants and a large drying and screening plant, up to 450 t.p.h. of concrete, asphalt, mason's and plaster sands are produced. The drying operation makes many different bagged gradations for foundries, glass manufacturers, sandblasting, etc., as well as bulk, at the rate of 30 to 40 t.p.h.

Of even greater interest, however, is the family of four veteran sand producers who carry on this business. They are Mr. and Mrs. George Phelps and Mrs. Phelps' two sons, L. B. Carnes III and Gary W. Carnes. The late L. B. Carnes founded the company in 1944 after locating the deposit. He had previously been in the same business

The newer of the two 150-t.p.h. washing plants, with the scalping-classifying tank at the right and the car-loading bins at the left.

The sand drying-and-screening plant. At the right is a separate truck-loading installation with a conveyor scale, and at the far right the new 20,000-bag-capacity warehouse.



in southwest Georgia and under his direction the business prospered and grew.

Upon the death of Mr. Carnes in 1953 the then Mrs. Carnes took over the management of the company and kept it going and growing until her two sons were through school and able to help full time. The oldest son, L. B. Carnes III, now 27, is vice-president and production manager.

Silica production is under the direction of Gary W. Carnes, 25, also a vice-president. E. L. Jones is superintendent of mining operations, and S. B. Johnson is the superintendent of the drying-and-screening plant. George Phelps, whom Mrs. Carnes married in 1955, is sales manager of the firm, and Ronald W. Holden is secretary. An interesting sidelight is the use of a Beechcraft Bonanza 4-place plane for sales and other trips as sales are made all over the state.

The sand deposits consist of over 1,000 acres of the Citronelle for-

George W. Phelps, sales manager, with the plane used for sales trips throughout Florida.

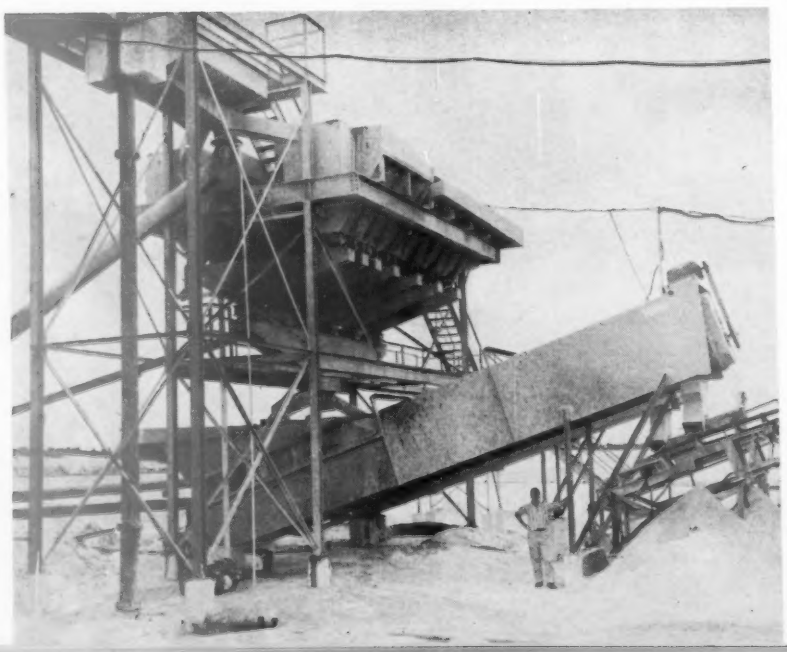
mation, which yields commercial sands in limited areas. This is a sharp, hard silica sand, 99 percent pure and with up to 5 percent kaolin in it. The deposits are up to 60 ft. deep, 15 to 35 ft. above water. The sand is very consistent, and selective mining is therefore not necessary; but some control of gradation is obtained by moving about in the two dredge ponds which are now active. The 2 to 3 ft. of light sandy overburden is removed by an Allis-Chalmers HD21 bulldozer and a Northwest 25D dragline with a ¾-cu. yd. Hendrix bucket.

The older washing plant east of the highway is supplied by a dredge with a 10-in. sand pump. The latter is driven by two D17000 Caterpillar diesel engines through belts to a single shaft, and all other pumps, hoists, etc., are driven from a jack shaft. The 20 ft. of 10-in. suction pipe and 10 ft. of Republic suction hose suspended from an A-frame make it possible to dig up to 30 ft. below water level, and the deposit extends 15 to 30 ft. above water. A jet on the nozzle, supplied by a 20-hp. pump, agitates the deposit. The dredge is anchored and moved by means of two shore lines in front and one in the rear.

The dredge is averaging approximately 200 t.p.h. through the 10-in. line of Armco spiral-welded pipe, which is about 600 ft. long, and against a 60-ft. vertical head. The dredge operator keeps the solids at about the desired 20 percent. Armco special analysis spiral-welded pipe and Republic suction hose and flexible couplings are used. When a suction hose because unsuitable as such it is switched to the discharge line.

The sand is discharged at the plant into a 3-ft. scalping screen which takes out the oversize. This unit has ¼-in. wire cloth, and the small amount of oversize is flumed to waste. The minus ¼-in. sand goes to a 7-compartment settling box. These compartments can feed in any desired combination to either or both of two pairs of 96-in. Link-Belt cone classifiers, along with all or a part of the overflow from the settling box. Overflow from the cones, containing a small amount of clay and fine sand, is wasted. The product is an extremely clean and well-graded sand.

With this arrangement, concrete and plaster or mason's sands can be



Left, middle: One of the two 10-in. hydraulic dredges supplying the two washing plants. The deposit is dug 30 ft. below the water level and extends 15 to 30 ft. above it.

Left, bottom: A closeup of the sand classifying tank and the screw washers at the newer washing plant.

made simultaneously or concrete sand alone. Specification asphalt sands are also made. Capacity ranges from 100 to 200 t.p.h., depending largely on what is being made. Each pair of cones is over a separate track for direct loading into cars.

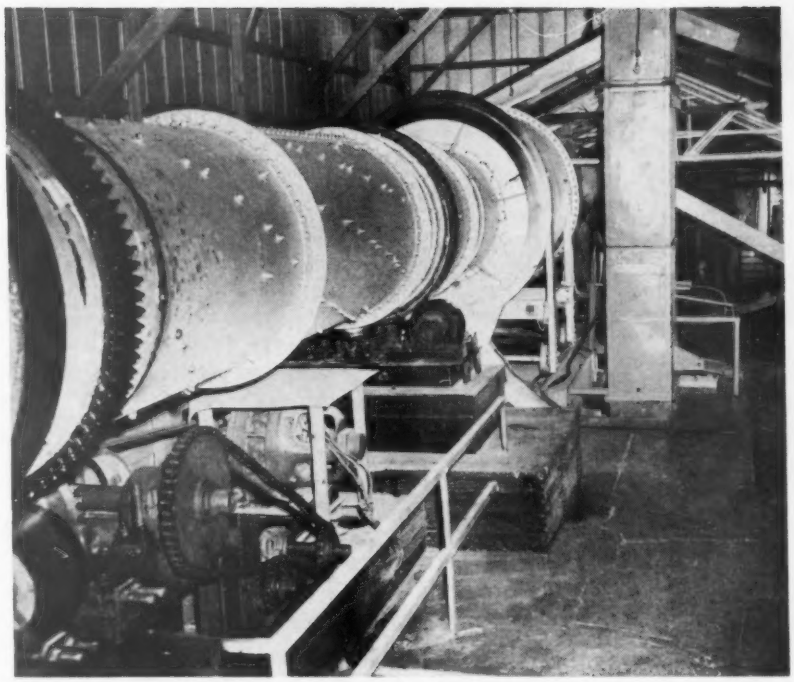
The newer washing facility operates in a similar deposit west of the highway. This dredge is similar to the other one, with a 10-in. pump, etc., but is electrical. A 300-hp. G. E. motor drives the pump, and Clyde hoists are used. Pumping through a 1,700-ft. line of Armco pipe with a 60-ft. vertical head output averages about 150 t.p.h.

At the plant the line discharges into a 3-ft. scalping screen with ¼-in. openings. Oversize is wasted. Minus ¼-in. material flows to a 24-ft. Eagle Iron Works 7-valve dual water scalping-classifying tank with a 3-cell collecting-blending flume. This feeds as desired to a 36-in. by 25-ft. Eagle single-screw washer-classifier-dehydrator or a 54-in. by 34-ft. single-screw unit. Normally the first four tank valves are used for concrete sand and the last three for plaster sand, but any desired combination can be used. Either screw can be used for either product as the sand runs, but usually the larger screw makes concrete sand. Capacity averages about 150 t.p.h.

Sand from two screws is discharged on 24-in. parallel belt conveyors. These in turn discharge into 20-ton conical-bottom bins for loading into cars on two tracks.

Sand is brought in cars from either washing plant to the drying plant, which has been expanded over the years. Conveyors are used to feed the sand from track hoppers to the feed boxes of the two driers. These 4- by 38-ft. Maddox rotary driers are equipped with lifters and are direct-fired with Bunker C oil by Ray burners. Drying temperature is about 400 deg. F.

Bucket elevators and conveyors with Goodrich belting take the dried sand to the screen room, where sizing is usually done by four 2-deck vibrators—two 3- by 8-ft. Bonded Scale units and two 4- by 10-ft. Link-Belt units. Various gradations are made, from ¼ in. to 100 mesh. The products can go into four bins for car loading or to another pair of vibrators for other sizes. These 4- by 8-ft. Link-Belt screens have 60-mesh cloth. Their product goes direct to cars.



One of the two 4- by 38-ft. rotary driers, with the bucket elevator and conveyor to the screen rooms.

A separate 350-ton bin for truck loading is fed by conveyor and elevator. The loading-out conveyor has a Merrick Weightometer which makes it possible to load any predetermined amount into a truck.

Bagging facilities consist of a St. Regis one-spout valve bag packer which fills 100-lb. multiwall bags. The old small warehouse was recently supplemented by a new building with a capacity of 20,000 bags. This allows adequate inventories to be maintained for quick shipment. There are 8 different bagged gradations for foundries, glass manufacturers, sand blasting, filtration, etc. These products are also shipped in bulk. The capacity of this drying operation is 30 to 40 t.p.h.

The company has a well-equipped machine and repair shop, where much of the equipment used is designed and fabricated. There is also a well equipped laboratory and a modern, air-conditioned office building.

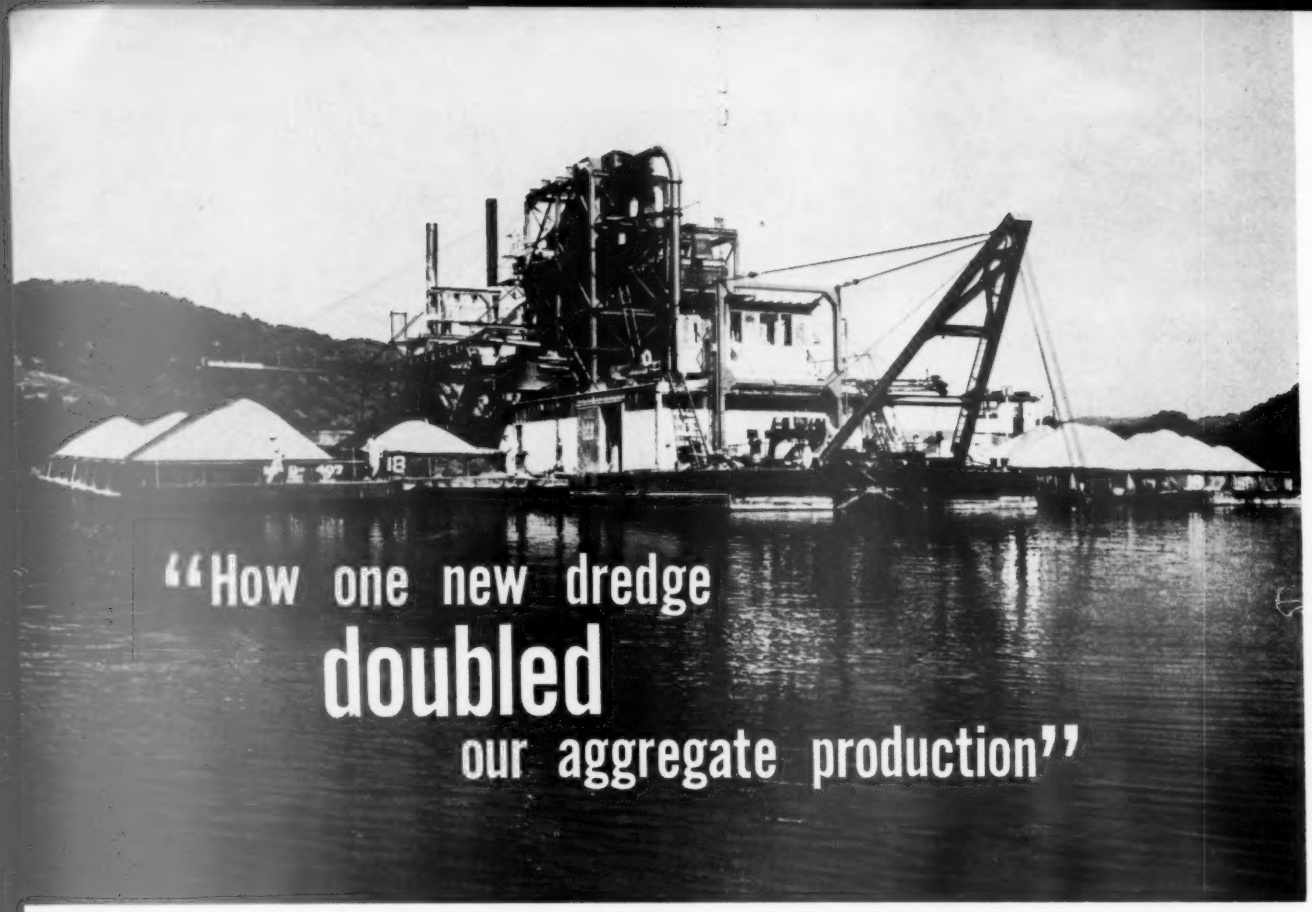
Cleveland Quarries Acquired By Cleveland Builders Supply

Cleveland Builders Supply Company has acquired control of Cleveland Quarries Company, South Amherst, Ohio. The latter concern will be operated as a separate business enterprise under existing management and personnel, and will continue to be headed by Dr. J. O. Kamm.

Cleveland Quarries, established in 1886, is reportedly the world's largest producer of sandstone. Other products are crushed stone and refractory sand. Silica Chemicals, Inc., is a subsidiary.

Cleveland Builders Supply operates 13 plants, 7 warehouses, and a dock, all in Cleveland. Products include concrete items; Dox floor and roof beams, slabs, plaster materials, and related items.

An announcement released by the Pennsylvania Glass Sand Corporation states that this firm will build a $1,000,000 chemical plant at an undisclosed site near Columbia, S. C. The operation will be the corporation's 14th plant.



"How one new dredge doubled our aggregate production"

By **JAMES T. WAKLEY**
President, Ohio River Sand & Gravel Corp., Parkersburg, W. Va.

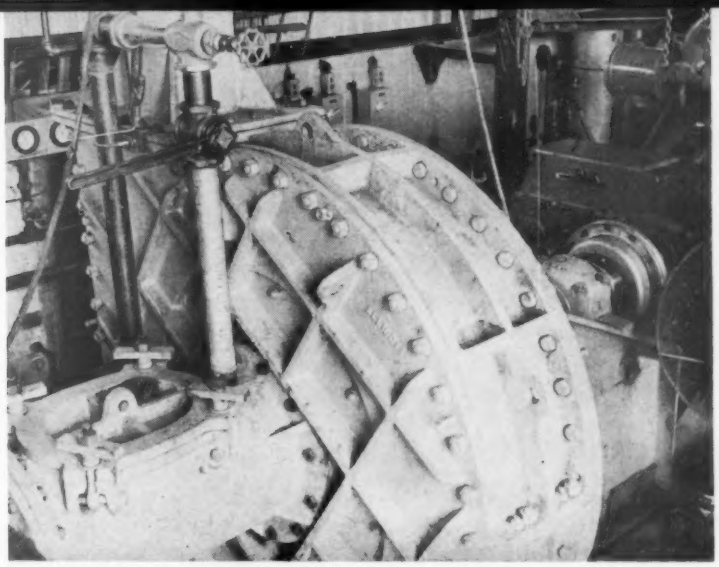
■ **INCREASING COMPETITION between producers of concrete aggregates has led to a reappraisal of production methods and output. Here's how one aggregate supplier increased his output 200 to 300 percent with one up-to-date hydraulic dredge!** **—The Editors**

OHIO River Sand and Gravel Corporation, with headquarters in Parkersburg, W. Va., has been recovering sand and gravel from the Ohio River for about 40 years. We supply road contractors, ready-mix concrete manufacturers, and state agencies with crushed and uncrushed aggregates for concrete and bituminous work in Ohio, West Virginia, and southern Pennsylvania.

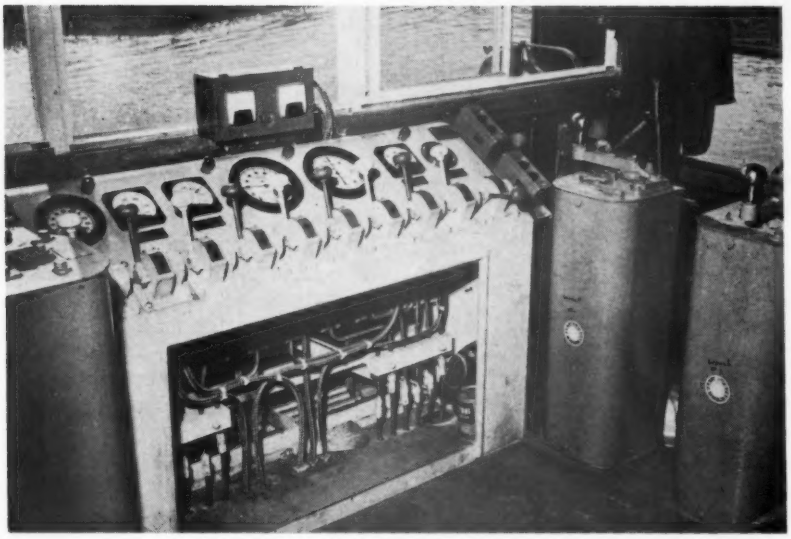
In recent years, with construction of all kinds on the up-swing, the need for sand and gravel has risen accordingly. So has the number of suppliers for this type of material. In addition, both the portland cement concrete and bituminous concrete industries require a greater range and size of materials.

In order to maintain his competitive position, the aggregate supplier must (1) be able to recover and process a wide range and quality of aggregates, by means of versatile recovery equipment; (2) have production facilities of sufficient capac-

Opposite page:
An over-all view of the dredge JOE LUCAS. Sized aggregates are loaded onto double rows of barges on either side of the dredge.



The 15-in. dredging pump on the new dredge, with the speed reducer drive from the 520-hp. diesel engine.



The control room of the dredge, from which all phases of the dredging operation are supervised and controlled by one operator.

ity to permit him to keep up with increasing aggregate needs. He must also be able to produce more tons per man-hour because of greatly increased labor costs and at the same time maintain a static price structure because of competition.

Evaluation of these various factors led to our decision to improve our operations with a new 15-in. hydraulic cutterhead dredge, fully equipped with its own materials-handling system. Dredging is not a new recovery method in our operation, since we have been using two ladder-type dredges for aggregate recovery for a number of years. However, recovery capacities and other limitations of these dredges indicated that new dredging equipment could be of prime importance in increasing and upgrading our entire aggregate recovery program.

DESIGN, CONSTRUCTION OF NEW DREDGE

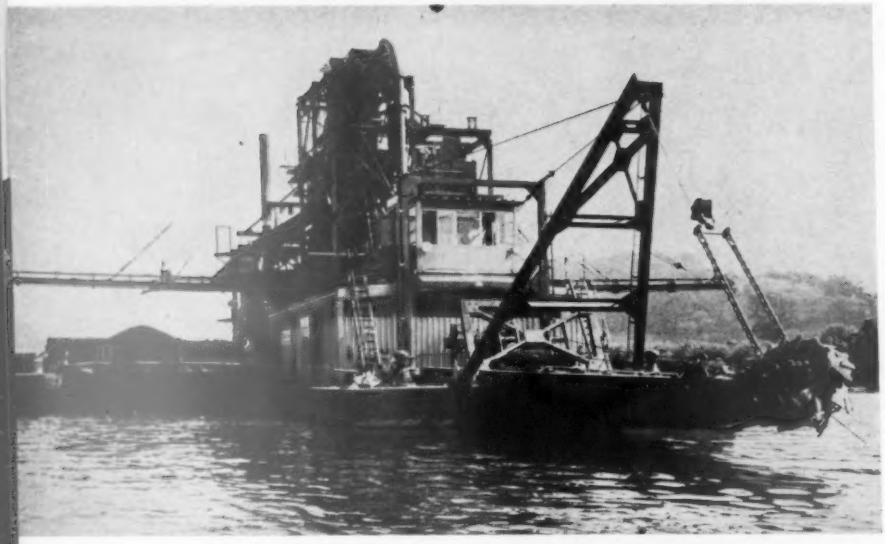
After deciding to invest in the dredge, we referred the problem of its design and construction to Ellicott Machine Corporation of Baltimore, a long-time designer and builder of floating excavating equipment for our company, to secure its engineers' recommendations for the necessary dredging machinery.

After a thorough study of our requirements and consultation on them, Ellicott made its recommendations for the dredging pump, spuds, winches, cutter, and ladder. We accepted their specifications.

Because of the variety of non-dredging equipment to be installed on the dredge, Ellicott worked closely with us to ensure the building of a balanced, efficient unit. Ellicott also designed the hull to float the entire plant.

PRODUCTION CAPACITY DOUBLED

Once the decision had been made to develop the new dredge, we felt it important to have it operating as soon as possible. Due to the excellent co-operation of our suppliers and efficient planning and supervision by William Shepherd, manager of operations, and Robert Hollenbeck, marine superintendent, the new dredge was designed and substantially completed within three months. Since it went into opera-



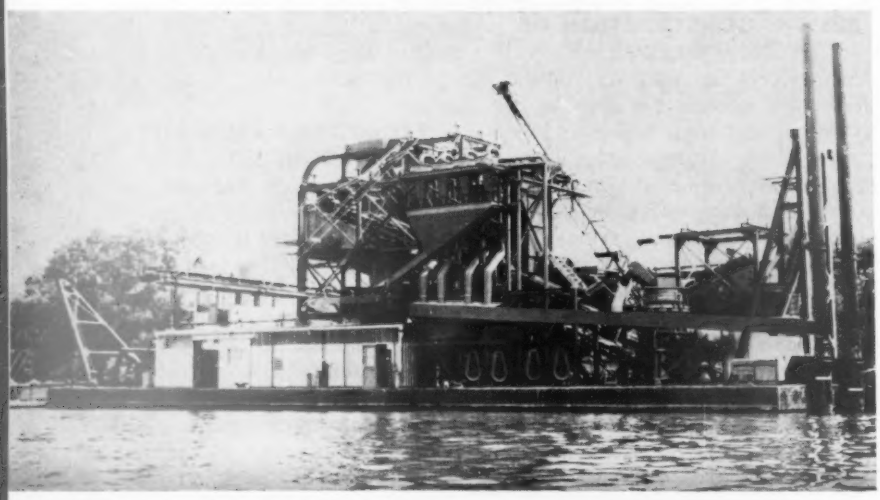
The hydraulic cutterhead and supporting equipment for Ohio River Sand and Gravel Corporation's JOE LUCAS dredge.

tion late in 1960, the new dredge, the *Joe Lucas,* has given us performance and increased production fully justifying the changeover.

Increased Production Our previous aggregate recovery system had involved the use of two ladder-type dredges, each with a capacity of 60 to 150 t.p.h., depending on the type of material being handled. In comparison, the new 15-in. hydraulic dredge has a capacity of 300 to 500 t.p.h., again depending on the material it is recovering.

Combined production capacity of the new dredge with the two ladder-type units is now averaging a 200 percent increase over previous production records. This can be attributed primarily to a highly efficient dredge pump and greater screening and crushing capacities. The line of flow is simple, with the least amount of restriction to the flow.

Increased Barge Capacity In recovering aggregates, we loaded the processed aggregate onto barges tied up beside the dredge. When we were using the ladder-type dredges, which had 120- by 32-ft. hulls, we could use only 100- by 26-ft. barges for



Left, middle: Raw aggregates are delivered to the No. 1 screen, a 2- by 14-ft. three-deck vibrator (upper right), in the initial phase of processing. The gravel washer is in the bottom, center, with the crusher at the right.

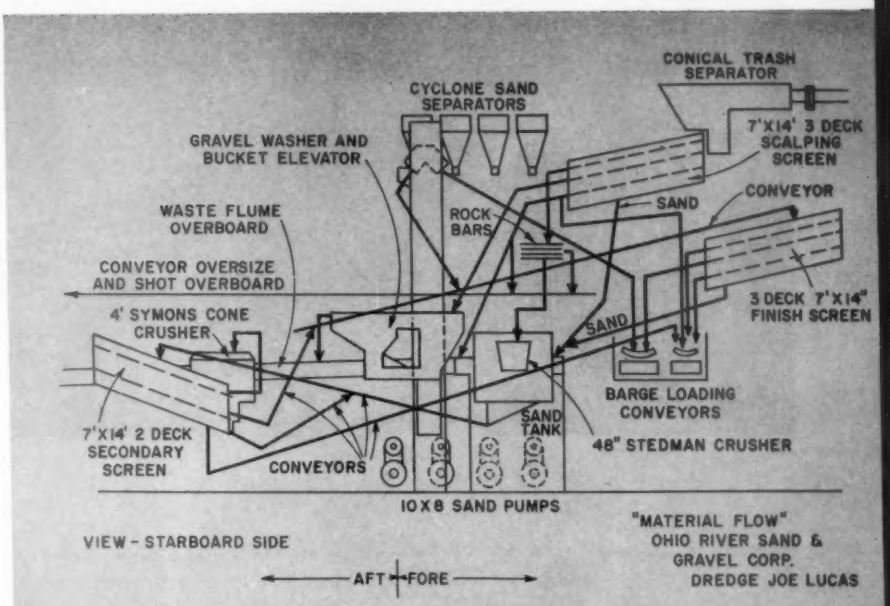
Left, bottom: This view gives a general idea of the arrangement of the processing equipment from the opposite side of the dredge.

receiving the processed aggregate. The larger hull dimensions of the new 154- by 38-ft. dredge enable us to use 150- by 30-ft. barges, which hold roughly twice as much material as the barge used with ladder-type dredges.

Abrasion-Resistant Features Since the dredge was to be digging highly abrasive materials, it was important to equip it with parts certain to withstand wear. The Ellicott cutter, for example, is provided with teeth of manganese steel, which upon constant impact with the gravel become more and more abrasion-resistant.

The 15-in. Ellicott pump is fully lined with wearing parts made of Ni-hard; it is designed to operate at 360 r.p.m. and to pump between 11,000 and 12,000 g.p.m. of water. Driven by a 520-hp. Caterpillar diesel engine through a Falk reducer, it has pumped up to 520 tons of aggregate per hour.

The design of the new cutterhead also makes it possible for us to dig into islands, which was not possible with the side ladder dredge.



● This drawing illustrates the beneficiation plant and material flow of the new dredge now in operation.

OPERATING DESCRIPTION

Sand and gravel is discharged from the dredge pump line into a conical trash separator, which removes the large sticks and coal by centrifugal action. This trash is spilled into an overflow flume, along with some fine sand and excess water. The fine sand is recovered through a fixed screen in the bottom of the overflow flume. The underflow of the separator and this sand flow to the No. 1 screen, a 7- by 14-ft. Hewitt-Robins 3-deck vibrator.

Overflow from the top deck of the screen is chuted to a set of rock bars which reject plus 5-in. gravel into the river *via* a belt conveyor. The 5- to 1¼-in. gravel through this grizzly is conveyed to a 48-in. Stedman impact-type crusher for primary reduction and the removal of any soft particles. The crushed material is then conveyed to the No. 2 screen, a 7- by 14-ft. Hewitt-Robins 2-deck vibrator. Overflow from this screen goes to a 4-ft. Symons cone crusher and then back to the No. 2 screen.

Underflow from the No. 2 screen is fed by a conveyor to the No. 3 screen, also a Hewitt-Robins unit. Normally this contains 100 percent crushed material. This dredge has three barge-loading conveyors with which three different sizes of crushed gravel can be routed by chutes to the barges. For instance, we may have 1⅞- by 1-in. material coming off the top deck of the No. 3 screen, 1- by ⅜-in. off the middle deck, and ⅜- by ⅛-in. coming from the bottom deck. We sometimes utilize only two decks of this screen when we are making one size of round

Closeup of the gravel washer.

Recovered aggregates being loaded onto barges. The new dredge permits the use of barges with approximately twice the capacity of former units, speeding up the over-all recovery program.

gravel and two sizes of crushed material. This dredge is set up to produce 100 percent crushed material, 40 percent crushed material, as is required in the State of Ohio, and 100 percent round material with the oversize crushed.

Material from the No. 2 deck of the No. 1 screen (3- to ⅜-in.) is routed by chute to a Fuel Process G8 gravel washer that removes coal and sticks by gravity separation and upflow currents. It has only three small motors, one for the drain screen and two for circulating water. The cleaned material goes *via* a 300-t.p.h. Fuel Process bucket elevator to a gravity chute which feeds to a barge-loading conveyer; any sand that is present passes through the No. 1 screen and is flumed into a sloped-bottom sand tank, feeding four 8x10 Allis-Chalmers rubber-lined sand pumps. We pump the slurry to sand cyclones, where excess water is removed. Underflow is then loaded by chute to an inside barge on the port side of the dredge.

A chute was installed to direct the round gravel from the gravel washer to the belt feeding the No. 3 screen. In this way, partially crushed material in three sizes can be furnished. We are also able to blend the material from the No. 3 screen with round gravel coming from the Fuel Process gravel washer onto a chute leading to a barge-loading conveyor.

At the Ohio River Sand and Gravel plant material is routed, more or less, through the crushing plant by adjusting the wire size on the No. 1 and No. 2 decks of the No. 1 screen. Through a system of slots in the chutes at the discharge end of the No. 1 screen, material can be put into the crusher from the top screen, from the middle screen, or both. Material from the No. 2 deck and/or the No. 3 deck can also be routed to the gravel washer. The advantages of this arrangement is that when there is a slow round gravel market, all materials can be routed through the crushing plant. Normally the company has a fair market for 1¼-in. to ¼-in. round gravel, and everything above 1¼-in. is routed to the crushing plant. We are producing material for the state of Ohio and the state of West Virginia.

Specifications for concrete aggregate and bituminous aggregate vary. West Virginia requires from 100 percent to 80 percent crushed material in bituminous work, and Ohio requires 40 percent material. Both states use either round or crushed gravel for concrete. The company produces every size in the West Virginia Specifications Book, ranging from 2- by 1-in. gravel to a ¼- by No. 8 gravel in both round and crushed sizes. We also produce the sizes ranging from a 2½-in. to 1½-in. material in the Ohio Specifications to a ⅜- by No. 8 material. In addition, we produce both state sand and mortar sand.

In our plant we can produce approximately 11 sizes of gravel for Ohio Specifications and 14 sizes for the West Virginia Specifications. (Normally we are required to produce five different sizes in Ohio and eleven different sizes in West Virginia.) We do not produce river-run material—the gravel and sand are reblended in our plant for sale as river-run or ballast. The gravel washer removes many of the flats and soft particles, as well as coal, lignite, and sticks. The cone separator also helps remove deleterious materials.

VITAL STATISTICS

The beneficiation and screening plant is installed on the Ellicott-designed hull, which was built by the Marietta Mfg. Co. The hull is 154 ft. long, 38 ft. wide and 8 ft. deep, permitting easy accommodation of machinery, with a 3-ft. freeboard. The Ellicott ladder permits the dredge to dig to 45 ft. (maximum) and is designed so that it can be lengthened if necessary. The cutterhead and auxiliary equipment are driven by a 100-hp. Westinghouse motor. All belt conveyors have Joy limber roller idlers. Lincoln multiguard electric motors with polyester embedded windings are used, and power for them is supplied by two Caterpillar diesel generator sets.

The dredge was named the *Joe Lucas* in honor of Joseph P. Lucas, former executive vice-president and currently a director of the company. In service since August, 1960, the *Joe Lucas* is presently working in the Ohio River near Wheeling W. Va. The efficient performance of the dredge has added appreciably to our ability to produce sufficient supplies of gravel to meet the requirements of our construction customers.

How Union-Camp's 5-Star Multiwall Plan increased a pallet payload by 400 lbs...without increasing its size!

A leading supplier of high density resins* had been packing his product in 50-lb. sewn-bottom multiwalls. This gave him an efficient, 40-bag (2,000 lb.) pallet load.

When he added a *low density* resin to his line, however, he found his existing bag wouldn't accommodate 50 lbs. of the new resin due to its increased volume. A slightly larger, sewn-bottom multiwall was tried, but this reduced the pallet payload to 32 bags (1,600 lbs.). Net "loss": 400 lbs. Net result: more handling . . . more trips to the warehouse . . . higher cost.

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Warehouse space saved

The pasted-bottom bag offered several outstanding advantages. It permitted better use of warehouse space. It increased the yield per warehouseman to *1,000,000 lbs. a month*. And it initiated the development of a similar design for the company's high density resins, which could increase the present pallet payload to 2,500 lbs.

Space-saving secret is in bottom of bag. New design (left) with rectangular-shaped base has 20 per cent more capacity than sewn-bottom bag (right).

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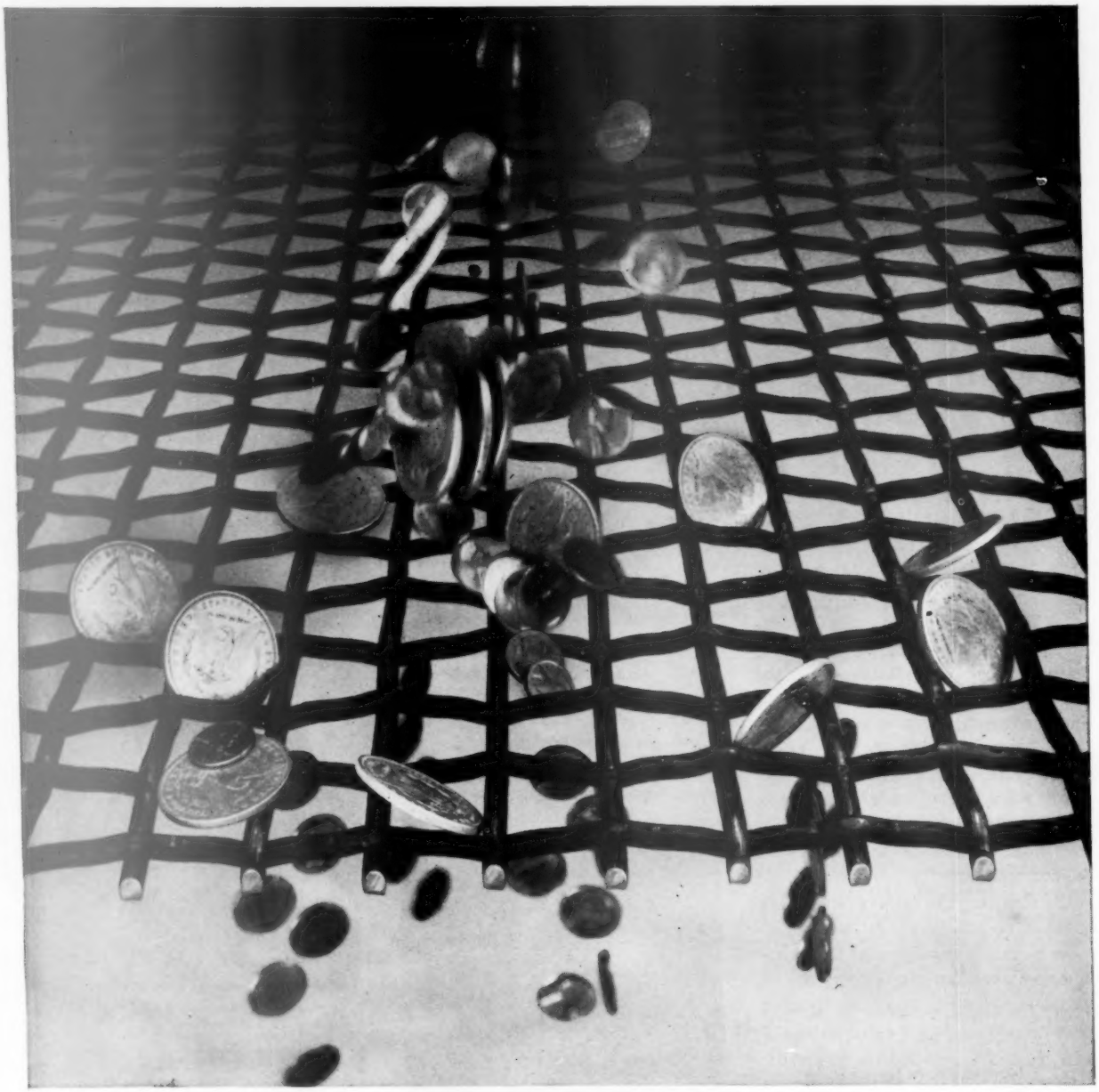

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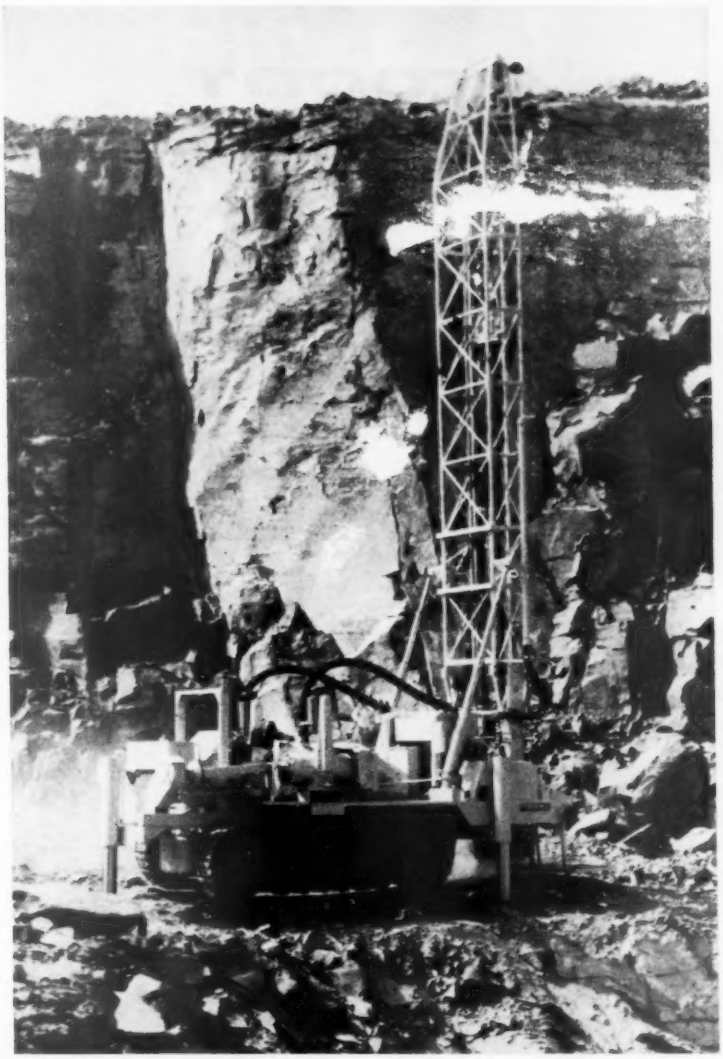

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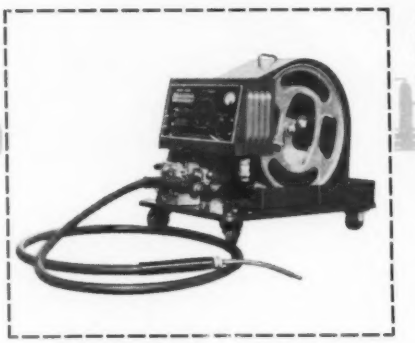

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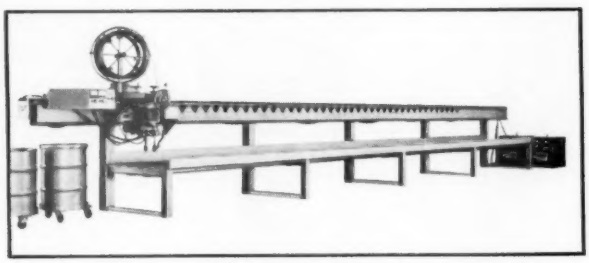

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Preliminary 1960 Report On Hawaiian Minerals Shows $9,300,000 Value

The value of Hawaii's mineral output established a new record of $9,300,000 in 1960, compared with $7,600,000 in 1959, according to the U. S. Bureau of Mines. An outstanding event of the year was the first full-scale production of portland cement at two newly constructed plants on Oahu Island.

Anticipated gains in the production of sand, gravel, and stone materialized when the quantities required to keep pace with Hawaii's construction boom reached 4,000,000 tons with a value of $7,800,000, compared with 3,500,000 tons and $6,700,000 in 1959.

In 1960 Hawaii's mineral industry reported to the Bureau of Mines that 695 employees worked a total of 1,031,353 man-hours. There were 2 fatalities and 35 nonfatal lost-time injuries.

There was no notable change in the marketing pattern of the mineral industry during the year. None of the minerals produced and processed in Hawaii was exported. Inter-island shipments were limited to sand and volcanic cinder barged from Molokai to Oahu, and trachyte from the island of Hawaii to Oahu. Mineral material receipts from the mainland consisted chiefly of cements, petroleum products, natural asphalts, salt, and special construction, chemical, and fertilizer materials.

Heavy demand for construction materials raised Hawaii's mineral production to a new record in 1960. This state's structural concrete and concrete products industry became virtually self-sufficient during 1960, with the two new cement plants.

With a combined annual production capacity of 2,700,000 bbl. (more than double Hawaii's past annual rate of consumption) the new $25,500,000 cement industry expanded still further the use of portland cement concrete into all areas of construction, including homes and highways. Technical advancements in Hawaii's construction industry brought about increased use of prestressed, precast, thin-shell, and lift-slab concrete members and concrete tile, block, and pipe.

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BEFORE

This limestone quarry is operated by the Rockland-Rockport Lime Co., Inc., Rockland, Maine. Before shooting, the face was about 55 ft. high and had a slight amount of toe (foreground).

Modern Blasting Methods Pay Off In Historic Limestone Quarries

ANOTHER P&Q EXCLUSIVE

LIMESTONE quarries that once furnished hand-cut stone to ballast the holds of South Seas-bound clipper ships are today the scene of a quarry operation where modern drilling and blasting methods have cut rock costs 75 percent and doubled production. These quarries are near Rockland, Maine, a rocky coastal area from which limestone has been quarried continuously since colonial times. Maine limestone has been shipped to all parts of the United States and throughout the world.

One of the quarrying firms, Rockland-Rockport Lime Company, Inc., has been producing agricultural lime

AFTER

Excellent fragmentation from these shots has boosted plant production from 200 to 400 t.p.d. without adding new equipment.

Nine holes were drilled along the face on an 18- by 12-ft. burden and spacing. Holes, 57 ft. deep, were bottom-primed and loaded with 394 lb. of explosives in each one.

since the latter part of the 19th century. Until the 1950's, Rockland Lime produced calcined lime, employing a large number of vertical brick kilns.

At the quarry, jackhammers were used to drill the blastholes, and the rock was broken out by bench shooting followed by blockholing—a rather tedious method which required a large quarry crew. On a normal shot about 17 men were needed for drilling, loading, and hauling.

An average round consisted of about 50 10-ft. holes drilled on 5- by 6-ft. burden and spacing and loaded with a total of about 150 lb. of 40 percent or 60 percent gelatin dynamite. This type of round dislodged about 562 cu. yd. (solid) of rock or about 1,237 tons. Powder factor was about .27 lb. per cu. yd. (solid). A vast number of electric blasting caps—about 20,000 a year —were used in the last few years in which blockholing was done.

In 1954, however, a change in the company's top management brought in a new approach to operations. When Ardrey Orff, who had been with the company for 40 years, was named president, he immediately instituted several major changes. His first act was to abandon the calcining operations and install a new 200-t.p.d. crushing plant for producing pulverized lime.

Next, technically trained personnel with needed production experience were brought in to run the plant. One of these, David R. Hoch, was recently named vice-president and acting general superintendent.

In 1956 the capacity of the plant was boosted to 400 t.p.d. with new equipment. Shortly thereafter the effects of a rock shortage began to be felt. With jackhammer drilling, they could not get enough rock from the quarry to keep the plant supplied. It was necessary to shut down operations periodically in order to build stockpiles.

Therefore, in 1959 Rockland Lime management abandoned jackhammers and switched to deep-hole drilling. With the aid of technical representatives from Atlas Powder, quarry foreman Donald Bickford set up a series of test shots using a rented "down-the-hole" rig for the first time.

The first test round consisted of 18 6-in. holes drilled in two rows of nine each on 14- by 22-ft. burden and spacing. Depth of the holes was about 55 ft.

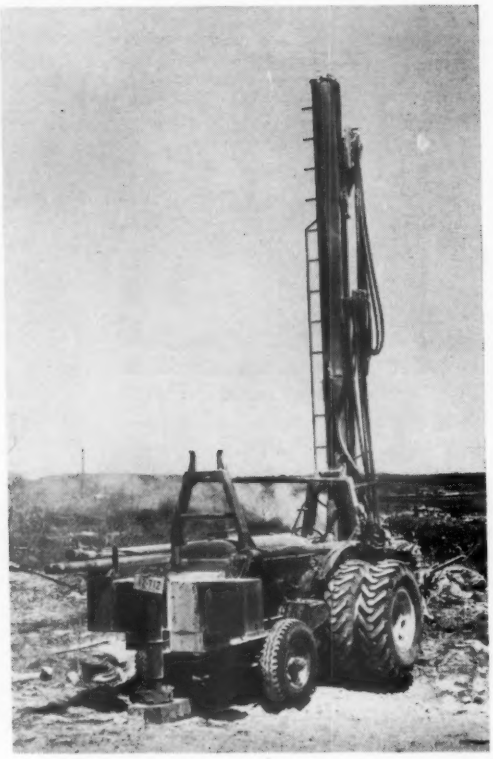
At the base of the high wall there remained a 45-ft. toe, left over from bench shooting. The round was loaded with about 13,500 lb. of explosives consisting of a combination of 60 percent and 75 percent gelatin dynamite in the lower part of the holes, topped with ammonium nitrate and gelatin dynamite boosters. Powder factor was about .78 lb. per cu. yd. Fired with millisecond-delay electric blasting caps to keep vibration to a minimum, this first shot broke out about 18,000 cu. yd. of rock.

The problems were not over. It soon became evident that much of the stone from the quarry was too large. Considerable production time was being lost at the primary crusher —a 24- by 36-in. jaw crusher. A large portion of the rock was too large to enter the crusher even when it was opened to maximum clearance. That which did pass through the crusher at maximum clearance was too large for the secondary crushers to handle.

If the crusher was tightened up to feed rock to proper size to the secondaries, considerable jamming occurred, causing much down time. Consequently, the company was still unable to get full capacity out of their expanded plant. With down time and shutdowns, output remained about 200 t.p.d. although drilling and blasting costs were reduced about 50 percent.

Since the real cost of operations was the cost of crusher time, it was decided, on the advice of Atlas technical representatives, to shoot heavier and make the rock as small as possible in the quarry. In this way the primary crusher would be able to do most of the work of further reduction. The firm purchased its own rock drill — a Schramm Pneumatractor Rotadrill. This unit

Aquatol, a high-density TNT-AN packaged slurry explosive, was loaded into the bottom and middle of the hole.



This drill was purchased by Rockland-Rockport Lime Co. in 1959. It has paid for itself in terms of previous rental costs.

is now about a year old and has already paid for itself in terms of rental costs.

For a shot in March, 1961, nine 4½-in. holes 57 ft. deep were drilled on 12- by 12-ft. burden and spacing in a single row along the face. Each hole was loaded with 394 lb. of explosives consisting of 80 lb. of 75 per cent Giant gelatin primer, 140 lb. of Gianite WR water-resistant ammonium nitrate, and 175 lb. of Aquatol, an ammonium nitrate slurry explosive which provides high density and water resistance. The powder factor was about 1.3 lb. per cu. yd. The powder column was as follows: primers at the bottom; high-density Aquatol two-thirds of the hole; and Gianite at the upper part of the hole.

The shot was fired with Rockmaster millisecond-delay electric blasting caps, using four delay periods. Initiated at the bottom, to throw out the toe and promote better fragmentation, holes 1, 2, 4, and 6 were fired instantaneously, and holes 3, 5, and 7 were delayed 25 milliseconds. This staggered arrangement of millisecond delays develops maximum stressing in the rock and improves breakage.

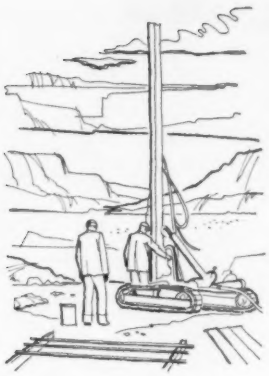
The round broke out about 6,330 tons of well-broken limestone in the desirable size range of 8 to 10 in. and under. In addition, this type of shooting produces a substantial amount of fines, which contribute to increased production.

Heavy shooting has paid off for Rockland Lime. Mr. Hoch reports that plant tonnage has been doubled to 400 t.p.d. without adding new equipment. Quarry operation costs are now about 75 per cent lower than they were when jackhammers were in use. The excellent fragmentation has enabled the primary crusher to be tightened up to its minimum clearance—2 in.

Best of all, the frequent shutdowns and down time have been practically eliminated, improving production scheduling immensely. Total production is also up. In 1960 the firm produced 85,000 tons of pulverized lime—an increase of 20 per cent over 1959.

The 1960 edition of the *Compilation of A.S.T.M. Standards on Cement,* published by the American Society for Testing Materials, is now available. It includes eight specifications, 26 methods of test, and several definitions. New material added covers false set of portland cement, fineness of hydraulic cement by the No. 325 sieve, and potential sulphate resistance of portland cement. Four specifications and eight test methods previously published were revised. Published by A.S.T.M. Price, $4 per copy.

Earnings of National Gypsum Company are expected to rise to about $2.10 per share in the second half of 1961, and total sales to $123 million. Last year, second half earnings were $1.99 per share and sales $119.5 million.



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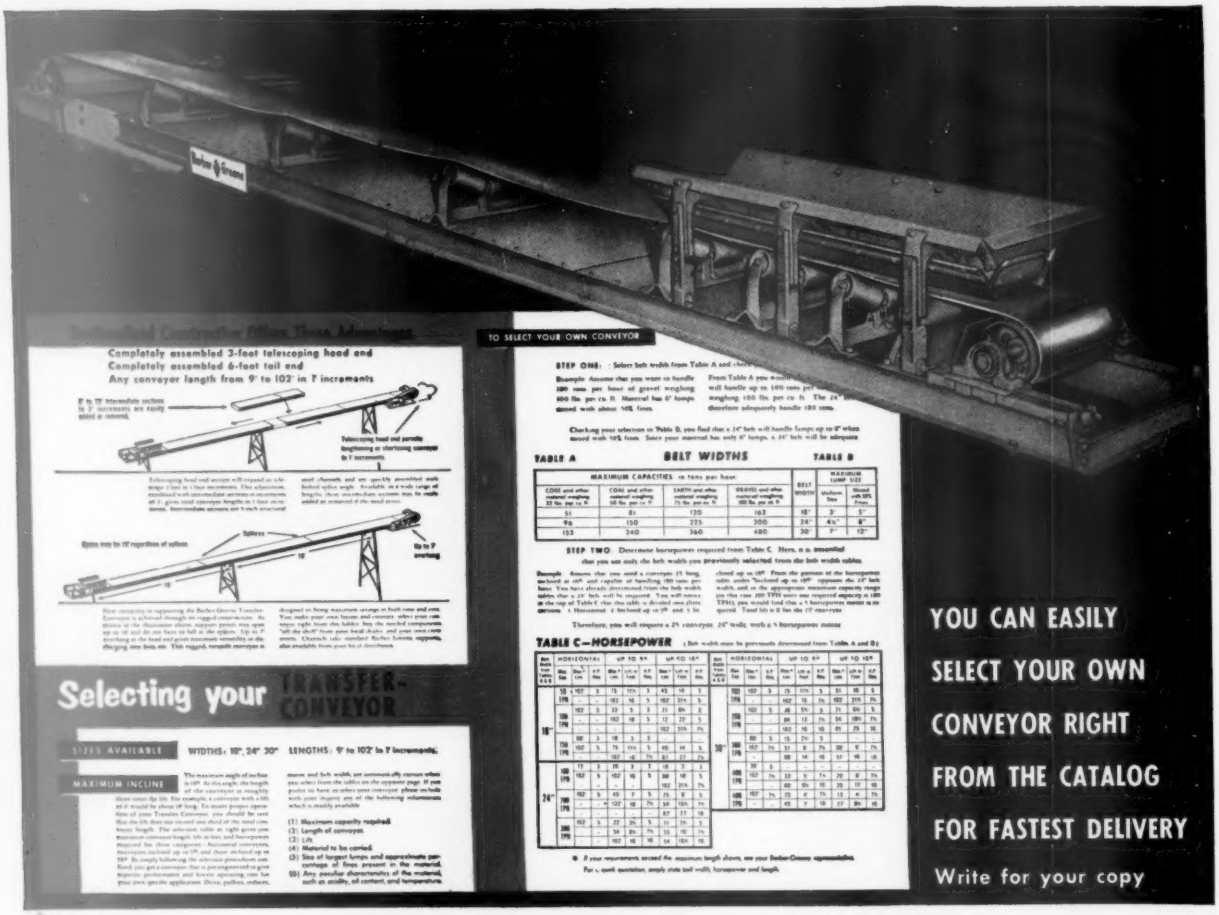

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By J. RICHARD TONRY*

Heat Transfer Systems for Dry-Process Kilns in Cement Manufacturing

Part II

HEAT transfer devices may be installed with new kilns as complete systems, or as additions to existing kilns, for the purpose of increased production, for fuel economy, or both. In a few instances the suspension-type preheater has replaced a waste-heat boiler; and in some cases it is operated with a waste-heat boiler in the system. Table I lists typical installations of heat transfer systems in the United States.

These systems require complete dust collection, which makes dust return an important consideration. As this collection is also accompanied by lowered gas temperatures, most of the alkalies and sulphur volatilized in the kiln are generally returned to the kiln. This is the consequence of such practically complete closed systems.

Fuller Preheater, Humboldt Suspension-Type

This system, consisting of four stages or vessels of cyclone type, heats the raw mix by gas-solid contact in a counter-flow system; new feed passes down through the vessels and kiln exit gases pass up from the kiln and finally are discharged. Heating of raw feed is very rapid; in about 20 seconds it is heated from about 100 deg. F. to 1,200 to 1,300 deg. F. In this process the materials pass rapidly through the range of early endothermic reactions involving loss of water and carbon dioxide from the carbonates.

As the higher temperature is approached in the last vessel, a more or less critical stage may be encountered. This varies among the raw mixes, according to characteristics of the materials, and consists of a "pasty" condition or loss of fluidity of the raw mix. As a result the feed pipe can become blocked. To eliminate this problem, plants are operated at some lower temperature that

TABLE I. HEAT TRANSFER SYSTEMS

Plant	Kiln Production Bbl/Day Average	Average Btu/Bbl Clinker	Temp. Material from Preheater	Temp. Exit Gas(F)	Kiln Size Diam.- Inside Shell	Fuel	Kiln Speed (rphr)
FULLER PREHEATER, HUMBOLDT SUSPENSION-TYPE							
1	1550	650,000	1380	600	9x125'	Coal	90
2	1765	935,000*	1230	550	10x120'	Coal	60
3	2614	660,000	1500	580	10'6"x150'	Coal	60
4	1802	981,000*	1350	600	10x140'	Coal	65
5	4000	800,000	1450	760	11x175'	Gas	70-75
6	2500	676,000	1350	1070	11x175'	Coal	90
7	2380	800,000	1400	600	10'6"x150'	Coal	100
SMIDTH PREHEATER, SUSPENSION-TYPE							
8	2400**	900,000**	1100	550	10x12x310'	Gas	60
SMIDTH INTERNAL HEAT EXCHANGER - CROSS SYSTEM							
9	2725	870,000	1200	950	11x390'	Gas	60
10	3700	800,000	-	900†	11'6"x400'	Gas	70
11	1855	700,000	-	1000	9x323'	Coal	92
ACL KILN (GRATE-TYPE PREHEATER)							
12	3750	695,000	-		12'6"x160' Grate: 12'6"x72'	Coal	62
13	4300	640,000	-	250	13x175' Grate: 12'6"x82'	Coal	65
CHAIN SYSTEMS							
14	4800	910,000	1700		12x350'	Gas	70
KENNEDY-GRUDEX PREHEATER - COIL-TYPE							
15	3000	687,000	1300	800	11'3"x200'	Coal	120

*Includes waste heat boilers
**Early start-up level
†Water cooled

*Senior manufacturing engineer, Portland Cement Association.

will not cause particles to agglomerate or stick to the vessel walls.

Important considerations in the operation of these systems are the gas temperatures and pressures in the vessels, plus the general procedures peculiar to each system. Tables II and III list these values.

In these preheater systems, air leaks and bleed-in air should be avoided because of the resulting increased gas volume and disturbance to gas flow in the vessels. Also, wherever cold air leaks into ducts, a build-up of dry material occurs above the point of entry. This is especially noticed if a fairly high sulphur content is present in the raw mix.

When a preheater system is used with other straight kilns in the same plant and using the same raw mix, the chemical analysis of the clinker will show a higher lime content. This is caused by the differences in dust loss and ash pickup by the clinker. The preheater system uses less coal and loses less dust.

Stage 4 in these systems is a most critical location, because thin scale or sticky raw mix can block the discharge, thus choking the vessel. Raw material may build up near the gas entrance, due to changes in gas velocity; such build-ups must be dislodged with bars through access ports. To avoid delays caused by choking in this stage, as well as other stages, a regular check of critical points is made by the operator on each operating shift. Any accumulations discovered are dislodged with air lances.

Since these systems are practically enclosed, little dust can escape; and as a result, the alkalies present in the raw mix cannot be removed. Sulphur is retained in the system, as demonstrated by results from a few installations.

In one plant with straight kilns and a preheater system, the following analyses of clinker were obtained:

Straight kiln: Na_2O—0.14 percent
K_2O —0.38 percent

Preheater system: Na_2O—0.13 percent
K_2O —0.60 percent

The volatilization and loss of K_2O normally experienced in a straight kiln could not take place.

In another plant, a similar result was obtained in the clinker.

Kiln without preheater: Na_2O—0.26 percent
K_2O —0.89 percent
SO_3 —0.66 percent

Kiln with preheater: Na_2O—0.27 percent
K_2O —1.29 percent
SO_3 —1.46 percent

Operating Plant 1 In Plant 1 (see Figure 8) the preheater was installed with an existing kiln and has been modified as the system was improved, as for example, the inclusion of a glass-fiber bag-type dust collector. As an

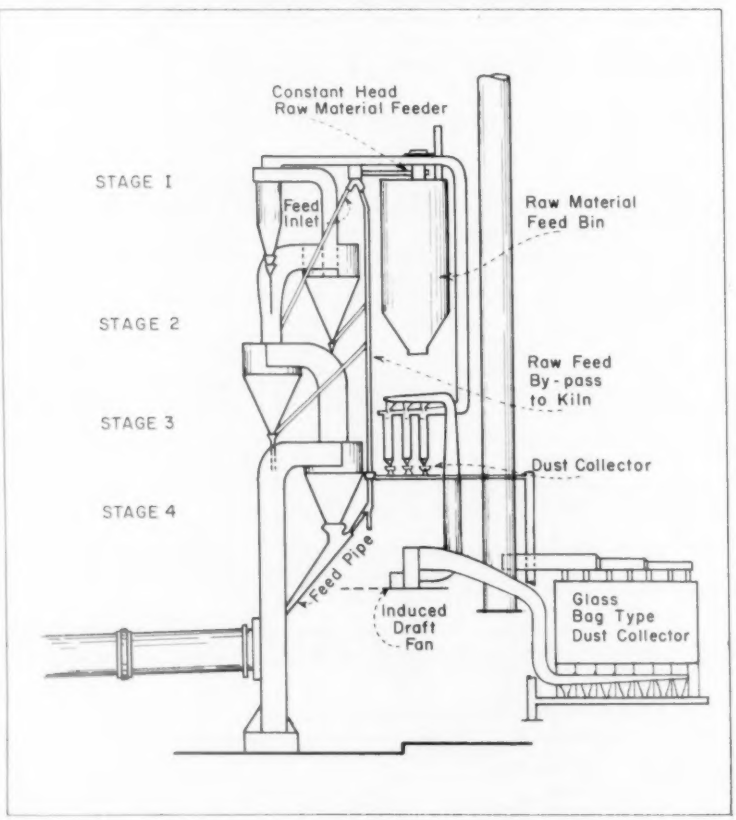
TABLE II. GAS TEMPERATURES IN F-H PREHEATERS

Plant	Stage 1	Stage 2	Stage 3	Stage 4	Kiln
1	765	1103	1358	1410	1740
2	550	610	910	1100	1810
3	580	660	1340	1560	1940
4	600	700	900	1250	1450
5	760	1140	1350	1520	1700
6	1100	1290	1300	1450	1500
7	600	1080	1380	1600	1800

TABLE III. STATIC PRESSURES IN F-H PREHEATERS

PLANT	KILN FEED END	STAGE 4	STAGE 3	STAGE 2	STAGE 1	CYCLON-ETTES	FAN
1	-	2.2-2.3	8.6	16.8	·	27.0	37.0
3	0.2	1.0	-	-	12.0	15.0	20.0
4	0.0-0.07	0.7-1.2	5.5	7.0-8.0	15.0	18.0	30.0
5	0.1-0.4	0.7-2.0	-	-	19.0	27.0	31.0
6	0.5-0.75	1.5	-	-	10.0	-	24.0
7	0.3	-	-	-	-	-	27.0

Fig. 8—The Fuller preheater (Humboldt suspension type).



aid to the operation of the kiln, hourly tests are made of the liter weight of clinker. A typical average figure for a 24-hr. day is 1,460 grams, which may be compared to 1,370 to 1,390 grams for straight kilns in the same plant.

Oxygen content of the exit gases from the kiln is held in the range of 1.0 to 1.5 percent.

The kiln operator makes changes in the fuel to the kiln and in the kiln speed and feeder speed, although the kiln speed is usually not changed.

As a check on clinker production, a Merrick Weightometer is used to weigh the clinker coming from the cooler.

In this installation the raw mix is delivered to the riser duct on Stage 2, thereby permitting Stage 1 to act as a scalper for material carried in the gas stream. The feeder and kiln speed are independently controlled from the firing floor, although, as mentioned above, the kiln speed is normally constant.

All dust from the collection system is constantly returned to the feed pipe. The dust return screw conveyors are interlocked with the kiln, and they shut off the dust feed whenever the kiln stops. This arrangement serves to avoid plugging the feed pipe.

Starting procedure for this system is adapted to the preheater and kind of fuel used. The procedure for a plant using *mixed bituminous* and *anthracite coal* is given. The draft fan is started first. Then the kiln is fired with oil until the front end is hot enough to burn the mixture of anthracite and bituminous coals used to fire the kiln in production. Coal is used with reduced quantity of oil, and the kiln is heated until the back end reaches 1,100 to 1,200 deg. F. At this time the kiln is continuously turned, and raw feed is added at a reduced rate. Dust screws are started; and gradually the kiln is brought up to full speed, with the feed increased for full production.

In Plant 2 the preheater system is successfully operated with a waste-heat boiler by allowing approximately 20 percent of the kiln gases to bypass the preheater and enter the boiler. Figure 9 shows an arrangement of this kind. In this

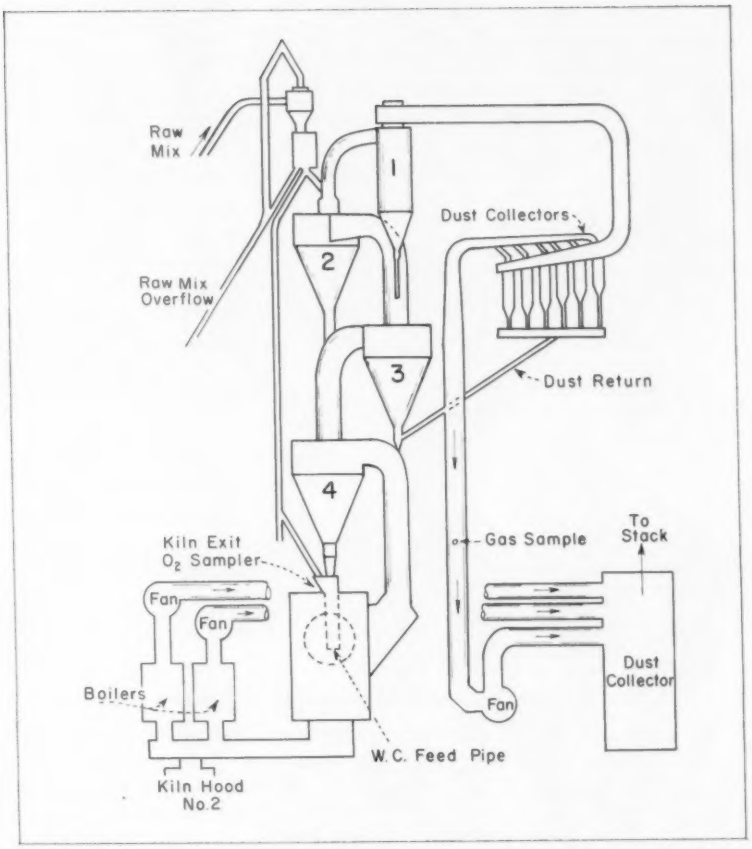
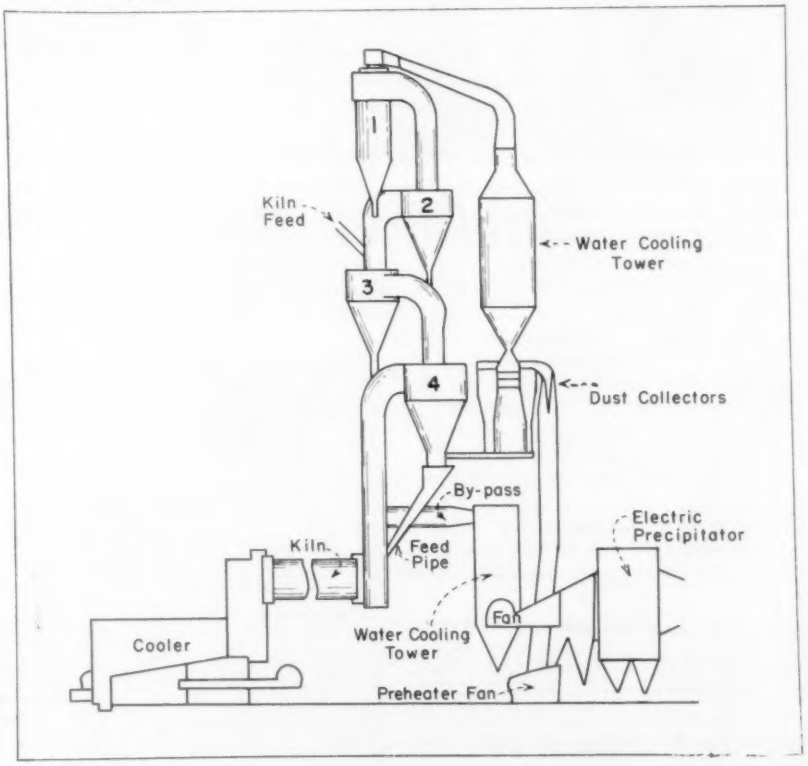


Fig. 9—Fuller preheater, Humboldt suspension type, used with waste heat boiler.

Fig. 10—Fuller preheater, Humboldt suspension type, used with water spray cooling tower.



system the preheater fan operates at constant speed, and the boiler fan is varied to make adjustments in kiln draft. The result is increased production, nearly 30 percent, as compared to straight preheater operation. A water-fog system is used, when necessary, to reduce the exit gas temperature going to the boilers.

In Plant 5 the preheater has been adapted to the use of raw materials containing combustible matter in the form of an oil-shale. Figure 10 shows the arrangement of this system, with the water-cooling tower located between Stage 1 and the mechanical dust collectors. Sprays of water are introduced at 10 to 12 g.p.m. to lower the temperature of the exit gas at this point. Another plant uses 25 to 30 g.p.m. for this purpose. The temperature limit desired is 610 deg. F. at the draft fan.

Gas analyzers are used to assist in holding 2.0 to 3.0 percent oxygen at the entrance to the water-cooling tower, sampling the gases coming from Stage 1. This is considered the most favorable location for sampling in this particular system. As a protection against explosions in the vessels, an automatic device shuts down the preheater system when combustibles in the gases reach the maximum of 3.0 percent. For this kind of operation all of the preheater vessels are refractory-lined.

Thus far, the only satisfactory procedure for processing a combustible raw material in this system is to quarry selectively, in order to minimize the amount present.

Smidth Preheater—Suspension Type

In this preheater system the raw mix is heated by direct transfer from gas to solid in counter-current flow by means of vessels in a concentric and horizontal arrangement. Two cyclones are mounted at the kiln elevation, and receive the exit gases from the kiln by means of a common duct. Inside each of these cyclones is an inner cyclone, producing a system of a "cyclone within a cyclone." Figure 1 (a)[1] shows a diagrammatic drawing of this preheater, with dust collection devices not shown. The remainder of the system is a 310-ft. long kiln, fired with natural gas and related equipment.

At the time of assembling this information, the system had been operating only a comparatively short time. It had been established that temperature of the feed leaving the preheater was critical, as "plugging" had been experienced, and a limit of 1,100 deg. F. was used to avoid this condition.

An advance in feeding of dry kilns was built into this system, consisting of a weighing belt conveyor for kiln feed. This was adjusted to deliver at the rate of 25 lb. per foot of belt, with variable belt speed. This conveyor was connected into the control panel, which included meters for feed to the kiln, on an hourly or daily basis.

In this preheater the kiln feed is introduced into the inner cyclone, discharged from the bottom into the main duct from the kiln, and carried up by the exit gases to the outer cyclone. From this point it discharges from the bottom into the kiln. The gases pass from the outer cyclone to the inner cyclone and then to the dust collection system. This is a combination of mechanical collectors and either an electrostatic or glass-fiber bag-type filter.

[1] See PIT AND QUARRY, July, 1961, page 152.

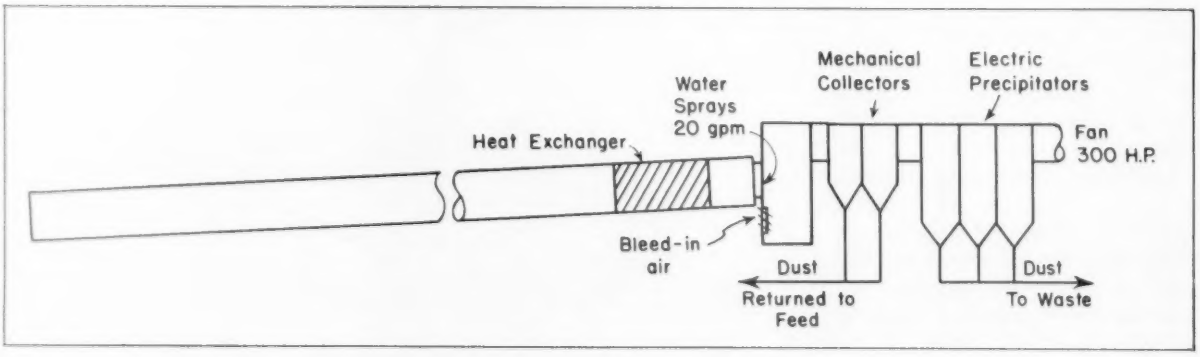
Smidth Internal Heat Exchanger —Cross System

The cross system is an internal heat exchanger, which divides the feed end of a kiln into four or five compartments in different systems. Figure 11 shows an installation using a five-chamber heat exchanger. Kiln feed enters the upper end, is divided among the compartments, and travels to the lower end, then discharges into the unrestricted kiln. By this means the kiln feed is exposed to a large heating surface on the metal plates and kiln lining, and a portion becomes suspended in the gas stream.

In a typical installation, temperature below the cross section runs 1,500 to 1,600 deg. F. and 900 deg. F. at the feed end. To lower the gas temperature to a safe 700 to 750 deg. F. for protection of the mechanical collector and the electrostatic precipitator, a water spray is installed at the feed end, and a bleed-in air damper is used. A balance is automatically maintained between water spray and tempering air, to maintain maximum draft for the desired clinker production. The water spray is installed at the feed end of the kiln, rather than in the exit gas duct, because of the dust-

(*Continued on page* 120)

Fig. 11—Smidth internal heat exchanger (cross section).



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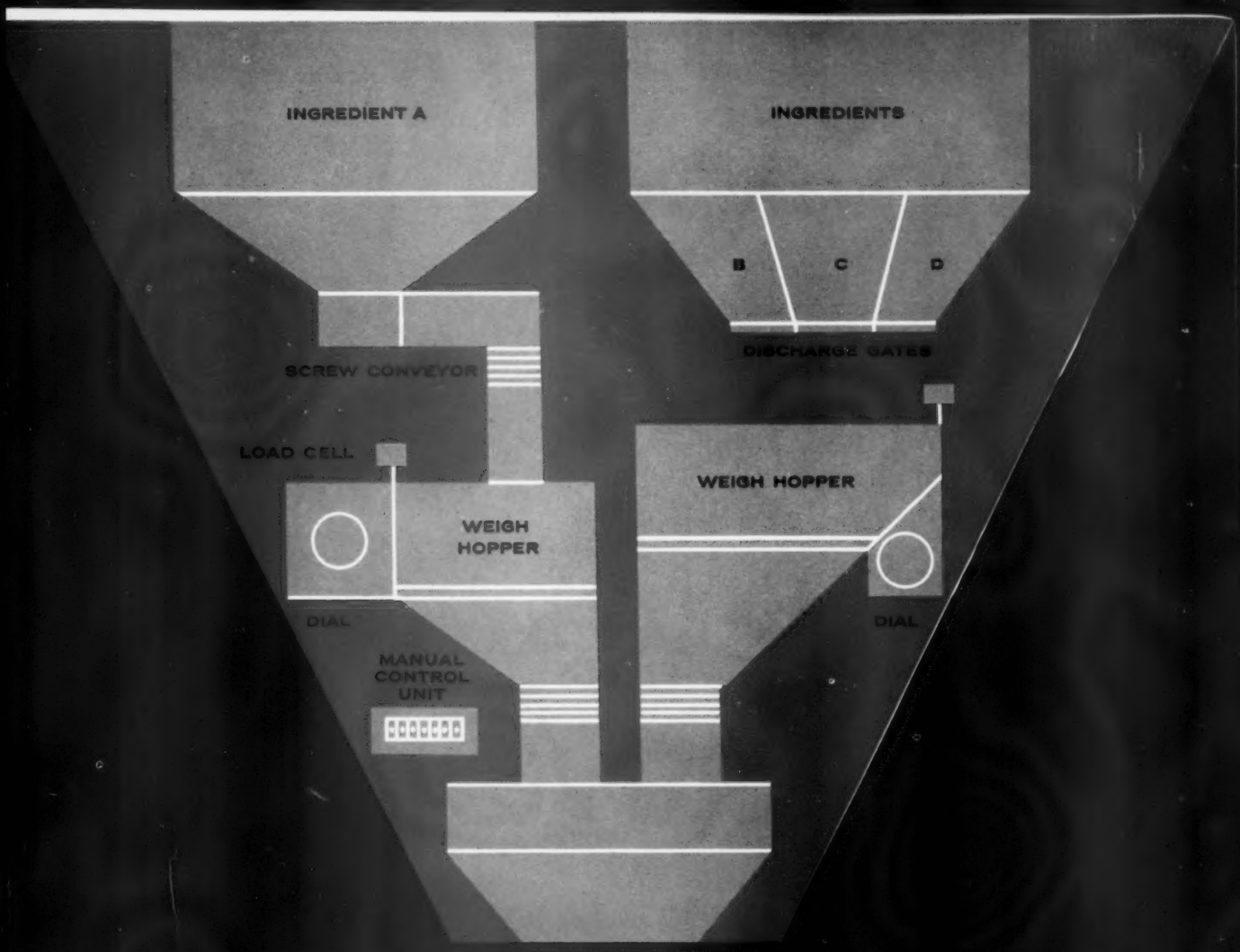

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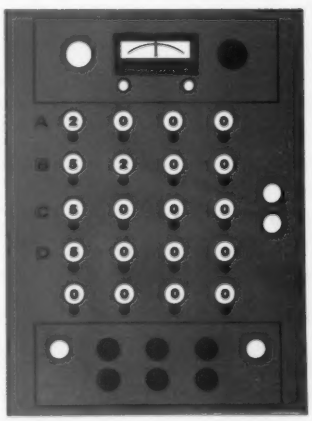

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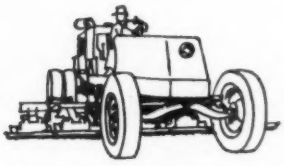

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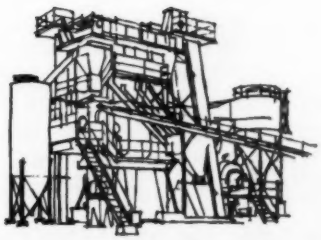

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Heat Transfer Systems

(*Continued from page* 116)

loading of the gases beyond the kiln end.

In one plant, experience with kiln rings was considered improved with the use of a heat exchanger, compared to other straight kilns. Firing must be well regulated to hold a safe operating temperature at the discharge of the cross section, thereby providing a more uniformly heated feed for the hotter portions of the kiln. Apparently, this preheating is sufficient to minimize ring formation.

In another plant, where the heat exchange system has been used for several years, maintenance has consisted essentially of replacement of the first section in each of the five compartments after approximately two years of service. The entire system consists of 25 sections.

Chain Systems

One of the most interesting developments in the improvement of heat transfer has been the use of a chain system[2] in a dry process kiln. Results have been satisfactory and their use continues, improvements being made as experience indicates proper procedures.

Two kilns with chains are operated in one plant. Each kiln has a different chain system—one being curtain-type suspension and the other the loop-type suspension. At the end of about one year of operation, the curtain-type suspension appeared to be the more favorable of the two. With the use of this heat transfer system and a waterspray for exit gas cooling, this kiln exceeds all straight dry kilns of record in terms of heat release (fuel burned), at 189.7 million B.t.u. per hour.

Curtain-Type Suspension The cross-sectional suspension was used for installing these chains, which produce a series of parallel curtains of hanging chains. Some of the chains at the bottom of the kiln produce a series of dams over which the raw mix must flow to proceed down the kiln.

During the first run with these chains, a few came out in about two weeks; and after nearly seven weeks, a hot spot developed at the front of the chain section, which resulted in a shutdown. This was caused by the loss of insulating refractories, apparently due to erosion caused by the front rows of chains. Replacement of a 7-ft. section of lining was made, using a super-duty fire-clay brick, instead of insulating brick. In the chain section a silica brick was used with success.

Chains were installed by using a block-and-bar system of mounting. The inside surface of the kiln was divided into 14 sections for the installation of three chains in each. Stainless steel blocks, ⅝ in. thick by 2½-in. square, were welded to the segments attached to the kiln shell. Across the top of the blocks, ⅝-in. stainless-steel rods were welded in order to hold the ends of the chains. Rods were placed extending across four blocks at one time.

Subsequent experience showed that this mounting was not satisfactory. A change was made, so that each chain was fastened to a single bar across two blocks.

The initial 21-ft. chain section was composed of three sections with different chains in each, as follows:

First section: four rows, stainless steel 309, ⅝-in. diameter stock, 2½-in. diameter links.

Second section: next four rows, ⅝-in. diameter stock, approximately 1- by 2½-in. inside diameter.

Third section: next eight rows, carbon steel chain, ⅝-in. diameter stock, approximately 2½-in. diameter links.

Experience indicated that additional chains could be added, and therefore a system twice as long was installed, thereby increasing the initial 16 rows of chain to 32 rows. The calculations shown below were made for the initial system:

Length chain section—21 ft.
Kiln diameter inside lining—11 ft.
Kiln volume in chain section—1,995 cu. ft.
Chains:
16 rows
42 per row
8-ft. lengths (total, 5,376 ft., approx.)
6.25 and 6.3 lb. per ft. (total, 34,612 lb.)
0.826 and 1.07 sq. ft. per ft. (total, 5,069 sq. ft.)

Chain density:

Ft. per cu. ft. $\frac{5,376}{1,995} = 2.69$

Lb. per cu. ft. $\frac{34,612}{1,995} = 17.4$

Sq. ft. per cu. ft. $\frac{5,069}{1,995} = 2.54$

Kiln production—4,800 bbl. per day
Fuel usage—970,000 B.t.u. per bbl.—1959
910,000 B.t.u. per bbl.—1960
Kiln evaluation:
Hourly kiln production per 1,000 cu. ft. of volume;

$$\frac{4700}{24 \times 33.220} = 5.9 \text{ bbl. per hr./MCF}$$

Heat released:

$$970,000 \times \frac{4700}{24} = 189,900,000 \text{ B.t.u./hr.}$$

Kiln speed—70 t.p.h.
Hood draft—0.1 in.
Feed end draft—1.1 in.
Temperature: Below chains 1,750 deg. F.
Dust collector inlet—710 deg. F.
Dust collector outlet—640 deg. F.
Water for cooling of gases—65 g.p.m. (280 p.s.i.)

Loop-Type Suspension The first installation with a steel chain was patterned in the same manner as for a wet-process kiln. The front row chains lasted six weeks, and the anchors were lost. The principal reason for this poor performance was metal corrosion, caused by oxidation and abrasion. Later replacements were of stainless steel 309 chain at the front of the system.

Chains were hung in loops, with the ends fastened 120 degrees apart and with no overlapping of chains from one section to the next. (Excessive wear of chains in the overlapping system was responsible for this method of suspension.)

The 20-ft. section of kiln contained three kinds of chains, as follows:

First section: two rows, stainless steel 309, ⅝-in. diameter stock, passing link style, 1.88-in. inside length by 1.44-in. inside width;

[2] See Fig. 5, PIT AND QUARRY, July, 1961, page 153.

rows are 4 ft. apart and chains are 15 ft. long.

Second section: two rows, steel chain, 5/8-in. diameter stock; rows are 4 ft. apart and chains are 15 ft. long.

Third section: two rows, steel chain, 5/8-in. stock; rows are 2 ft. apart and chains are 13½ ft. long.

Statistics for this system were as follows:

Length of kiln section—20 ft. 3 in.

Kiln diameter inside lining—10 ft. 3 in.

Kiln volume in section—1,670 cu. ft.

Chains:

6 circles

42 per circle

13½- and 15-ft. lengths (total 3,600 ft.)

4.7 and 4.1 lb. per ft. (total 16,260 lb.)

1.07, 0.826, and 0.642 sq. ft. per ft. (total 3,196 sq. ft.)

Chain density:

$$\text{ft. per cu. ft.:} \frac{3,600}{1,670} = 2.15$$

$$\text{lb. per cu. ft.:} \frac{16,260}{1,670} = 9.74$$

$$\text{sq. ft. per cu. ft.:} \frac{3,196}{1,670} = 1.915$$

Kiln production: 3,700 bbl. per day

Fuel usage: 1,010,000 B.t.u./bbl.

Kiln evaluation:

Hourly production per 1,000 cu. ft. volume:

$$\frac{3,700}{24 \times 29.558} = 5.2 \text{ bbl. per hr./MCF}$$

Heat release:

$$1,010,000 \times \frac{3,700}{24} = 155,700,000$$

B.t.u. per hour

Dust Collection In the kiln with curtain-type chain suspension, dust was returned to the kiln at the rate of 700 lb. per minute. Prior to the chain installation, dust return was at the rate of 400 lb. per minute. This dust is conveyed and elevated to the screw conveyor which feeds the kiln.

In the kiln with loop-type chain suspension, dust was returned directly to the kiln at the rate of 900 lb. per minute, compared with 500 lb. per minute before the chain installation.

Kennedy-Grudex Preheater—Coil Type

The coil-type preheater consists of a 6-in. diameter, spirally bent, heat-resistant steel pipe. Figure 4 illustrates the arrangement of the coil system at the feed end of the kiln.[3] Kiln exit gases flow around the coil and heat the raw mix flowing inside by conduction through the steel walls.

Raw mix is pumped into the two 2,000-ft. long coils, and the rate of flow is controlled manually from the firing floor through the Fuller-Kinyon pump system. Discharge from the coil is directed into the bottom of the kiln, which has special kiln blocks arranged to hold the load, preventing back spill.

Normal operation of the system requires 336 cu. ft. per minute of compressed air at 62 p.s.i., which is sufficient to carry the mix through the pipe. The temperature of the feed entering the kiln is about 1,300 deg. F., and the exit gases drop from 1,550 deg. F. to 670 at the preheater gas exit.

No dust is returned to the kiln, and dust loss amounts to 4 percent. This method of operation reportedly reduces alkali retention in the clinker being produced. Dust carried by the kiln exit gases deposits to some extent on the tube surfaces and must be removed daily. This is done through access holes in the structure by means of air lances. Close fitting seals are used on both ends of the kiln to reduce air leakage.

Wear of the tubing has been negligible as demonstrated by experience with two units in use for many years. A life of ten years or more is indicated for that section of tubing installed in the hottest zone. In the remainder of the system, tubing life is expected to be between 20 and 30 years.

ACL Kiln—Grate-Type Preheater

The grate-type preheater shown in Figure 2 permits recovery of heat from kiln exit gases by means of two passes through a bed of pellets made of raw mix.[4] These pellets contain 12 to 14 percent water and are heated from 100 deg. F. to approximately 1,600 deg. F. in about 20 minutes. During grate travel the early raw mix reactions take place, including: drying, dehydration, and partial calcination. Also, this bed of pellets traps dust carried by the gases, leaving a low dust load in the exit gases from the system. *(Turn Page)*

[3] See PIT AND QUARRY, July, 1961, page 152.

[4] See PIT AND QUARRY, July, 1961, page 152.

Operating statistics from two plants were as follows:

ACL GRATE-TYPE SYSTEM STATISTICS

TEMPERATURES	PLANT 12	PLANT 13
Hot Chamber - Upper	1860 F	1850 F
-Lower	425	800
Between Grates	860	750
Drying Chamber - Upper	500	550
- Lower	250	250
PRESSURES		
Hot Chamber - Upper	-0.25 in.	-0.3 in.
- Lower	-2.3	-2.0
Drying Chamber - Upper	-1.0	-0.9
- Lower	-2.3	-2.0
Firing Hood	-0.05	0 to -0.01
Kiln Feed End	-0.15	-0.5
Cooler Under-grate	+1.5	+3.0
Firing - Coal-air to Kiln	160 F	150 F
- Hot Air to Mill	450 F	-
- Burner Diameter	10 in.I.D.	10-3/4 in.I.D.
Pellet Moisture	13.5 %	13.0 %
Pellet Bed Depth	7 in.	7 in.
Pellet Grate Speed	44 in./min.	45 in./min.
Cooler Bed Depth	6 to 7 in.	4 in.

The most important consideration with this system is survival of the pellets. They must withstand thermal shock and dry without breaking. After drying, the pellets must have sufficient strength to remain intact as the temperature increases. If the pellets break down, the dust load in the kiln gases is increased, and the bed becomes blocked by dust, finally resulting in a shutdown of the kiln.

For this system, pellets are produced continuously in a pan-type pelletizer and conveyed to the feed hopper at the end of the grate. Raw mix and water in spray form are introduced into the lower right quarter of the pan with clockwise rotation. After an optimum operating speed and pan inclination have been established, normal operation requires only changes in water and raw mix quantity. The pan-type pelletizer (15 ft. in diameter and with 30-in. straight sides) is flexible in operation and may be changed in speed or inclination. One plant was running at 10.6 r.p.m. and at an angle of 59 degrees.

Pellet production is regulated by the operator's observation of size and water content. For example, good pellets appearing glossy when carrying the proper water content, change in appearance when they get too dry. Also, when this happens, pellet size varies, and there is a tendency for the pellets to change from too large to too small, in cycles. Actually, this operation depends largely on the observations of the operator.

Correction:

• The introductory paragraph of Part I, *Heat Transfer Systems*, that appeared in the preceding issue contained a typographical error of omission. The first two sentences should read as follows: "In recent years numerous systems for improving heat transfer in dry-process kilns have been installed in the American cement industry. One objective has been the improvement of fuel usage, and at the same time obtaining higher production rates, as compared to straight kilns."

One important factor in the operation of this system is the regular removal of the feed which accumulates at the discharge end of the grate. Ports in the sides of the grate chamber are used in barring loose this buildup of feed.

Samples from selected locations in a grate-system were analyzed to establish alkali content. (See table below.)

Clinker produced in this kiln contained more alkali than that contained in clinker from straight kilns. Fumes from alkalies may be seen in the front end of the kiln, and evidence of alkali fumes has been noticed in the cooler through refractory failures of the roof at the hot end.

Experience demonstrated that coal containing 3 percent or more of sulphur caused comparatively rapid blockage of the opening in the kiln at the discharge end of the grate. This material formed in layers; it was yellowish-brown in color and showed a high SO_3 content. Two samples analyzed 20.5 and 30.0 percent SO_3, respectively. Changing to coal with sulphur content of 2 percent or less improved this situation.

Summary

As a result of the use of internal and external preheater devices with rotary kilns, increases have been obtained in production rates, and fuel economy has been improved. More dust is handled with some systems in the dust collectors. Alkalies and sulphur are accumulated in some systems, resulting in higher alkali content in the clinker. Raw mix characteristics are important in these systems in regard to pelletizing, and fluidity at high temperatures.

	Na_2O	K_2O	Ign. Loss	As Na_2O Loss Free
Raw mix	0.15	0.62	35.0	0.86
Return dust	0.36	4.16	13.2	3.56
Pellets leaving grate	0.17	0.79	27.9	0.96
Clinker	0.17	0.90	0.0	0.75

Automation Conference-Show To Be Held in Los Angeles

The 16th annual Instrument-Automation Conference and Exhibit, sponsored by the Instrument Society of America, will be held September 11 to 15, 1961, in Los Angeles at the Biltmore Hotel and Memorial Sports Arena.

Approximately 80 sessions will be held, dealing with varied areas of instrumentation.

Special features of the exhibit will be displays sponsored by the United States Department of Defense, the National Bureau of Standards, and the National Aeronautical and Space Administration.

The conference and exhibit will be held in conjunction with I.S.A.'s 16th annual meeting.

The "Old Kennedy" burning plant operated by Basic Incorporated at Bettsville, Ohio, has been dismantled, and the rotary kilns have been shipped to Montreal, Canada. The firm's research and development department, pilot plants, brick production facilities, and chrome specialties plant are still maintained in Bettsville.

Bessemer Limestone-Cement Acquired by Diamond Alkali

Plans have been announced for the merger of Bessemer Limestone and Cement Company, Youngstown, Ohio, and Diamond Alkali Company, Cleveland, Ohio.

If the merger is approved by shareholders of both concerns, Diamond will issue one share of new $4 preferred stock for each three shares of Bessemer stock outstanding. Diamond will pay about $27 million for the acquisition. Bessemer last year earned $1,552,005 on net sales of $9.7 million.

Members of the N.L.I. executive committee attending the midyear meeting included: (front, l. to r.) W. J. Clark (Munnsville Limestone Corporation, Munnsville, N. Y.), 1st vice-chairman; L. R. Falk (L. R. Falk Construction Co., St. Ansgar, Iowa), chairman of N.L.I.; R. E. Meshberger (Meshberger Stone Co., Inc., Columbus, Ind.), 2nd vice-chairman. (Rear, l. to r.): R. O. Bemis (Basic Dolomite, Agric. Div. of Basic Incorporated, Cleveland, Ohio); M. R. Ackland (Stoneridge Limestone Co., Rochelle, Ill.); A. R. Alvis (Alvis Limestone and Concrete Products, Butler, Mo.), past chairman; P. W. Seitz (May Stone & Sand, Inc., Fort Wayne, Ind.), past president; J. H. Riddle (Riddle Quarries, Inc., Salina, Kans.), past president; G. A. Zeigler (M. J. Grove Lime Co., division of The Flintkote Co., Lime Kiln, Md.); and P. G. Potts (Southern Stone Co., Inc., Franklin, Ky.).

Limestone Industry's Problems

EXAMINED BY N.L.I. BOARDS IN JOINT MIDYEAR MEETING

By BUREN C. HEROD

CONSERVATION, highway and labor legislation, percentage depletion, and technical service were among the several important subjects of direct concern to crushed limestone producers which were carefully reviewed by the boards of directors of the National Limestone Institute in their recent joint midyear session. It was held in Chicago on June 11-13, and was attended by approximately 50 directors—testifying to the significance of developments affecting the producers' business and operations.

Concurrently with the N.L.I. boards, the directors of the Manufacturers' Division, headed by chairman Wayne W. King (W.S. Tyler Company), held their first midyear meeting since the division was organized.

L. R. Falk (L. R. Falk Construction Co., St. Ansgar, Iowa), N.L.I. chairman, headed the sessions. Executive committee and standing committee meetings opened each session. Reports and recommendations of these groups were presented to a final joint session of the two boards.

Floyd H. Millen (Valley Limestone & Gravel, Inc., Farmington, Iowa) presented the recommendations of the convention arrangements committees of the two divisions. As approved by the directors, the 1962 board meeting will be held at the Roney Plaza, Miami Beach, January 15-19. The 1962 annual convention is scheduled for June 18-21 at the Statler Hilton, Washington, D.C.

Mr. King, representing the Manufacturers' Division on the above arrangements committee pointed out steps being taken by the Manufacturers' Division members to assure an outstanding operating meeting during the next annual convention. Producers were invited to contribute comments on operating problems for consideration during the operating session next year.

The report of the legislative, public relations, and tax committees were delivered by Powell Potts (Southern Stone Co., Inc., Franklin, Ky.). On behalf of the industry, members of these committees, along with top officers of N.L.I., have spent considerable time in maintaining close contact with legislative developments—particularly in the area of percentage depletion.

Revenue Ruling 61-17, relating to the percentage depletion tax deduction, was a major topic of consideration in a meeting of representatives of the Treasury Department and N.L.I. At the request of I.R.S., an industry survey has been conducted, and certain inequities in the ruling have been spotlighted for the Internal Revenue Service. The committees urge increased effort toward obtaining a program of reinvestment depreciation.

With respect to the vital Agricul-

A concurrent meeting of the Manufacturers' Division board was attended by (from right) C. L. Rosselot (Even Spread Company); G. Lombard (American Cyanamid Company); G. E. Allen (Highway Equipment Company), 2nd vice-chairman; W. W. King (W. S. Tyler Co.), chairman of the division's board; C. W. Mayer (Bradley Pulverizer Company), past chairman; T. E. Bridgewater (Werco Steel Company); A. W. Fasold (Hewitt-Robins); H. J. Knudten (Universal Engineering Corp.); and P. K. Alvord (E. I. du Pont de Nemours & Co.), past chairman.

tural Conservation Program, the Agricultural Limestone Division committee recommends intensifying N.L.I.'s efforts directed at raising the annual federal appropriation nearer $500 million, and removing the state-by-state mandatory soil test. A grass roots effort based on stimulating farmers to acquaint their Congressmen on the most effective conservation measures was evaluated as having considerable potential.

N.L.I.'s extensive and varied public relations activities were cited as being highly beneficial to all limestone producers. Expansion of work in this area, as well as in legislative contacts, has the support of the association's boards and executive committee.

The Crushed Limestone Division committee endorsed continuation of N.L.I.'s activities in the highway field, which include support for an annual appropriation of at least $1 billion for ABC highways, and a change to a 75-25 matching ratio for construction of those roads; opposition to any stretch-out or slowdown in completion of the highway program, and to raids on the Highway Trust Fund for non-highway use; opposition to reimbursement of states for existing roads incorporated into the Interstate System until conclusion of the present highway program; and advocation of payment for certain costs incurred by changes in specifications, *i.e.,* raised bridge clearances, from defense or general fund revenues.

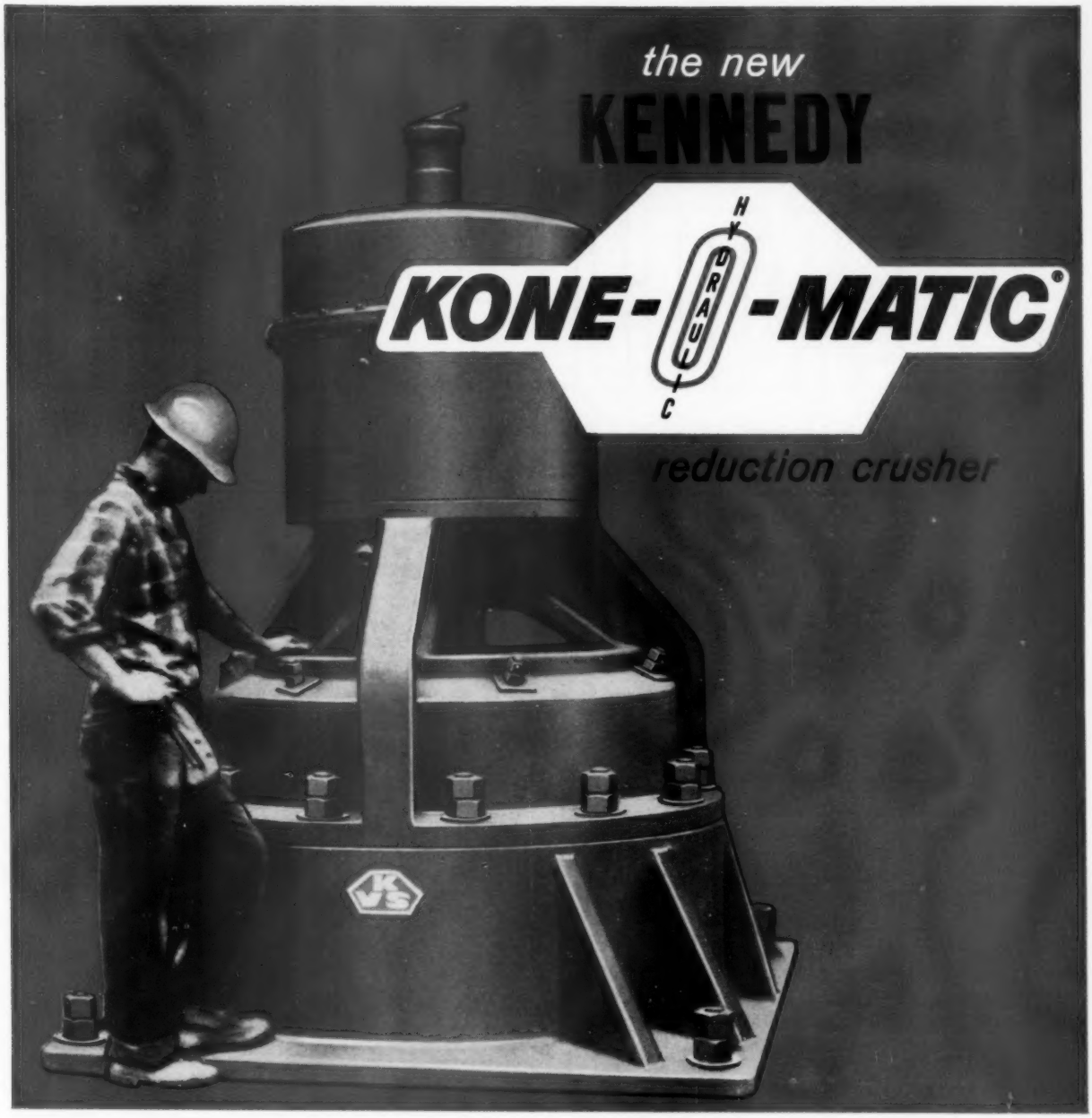
J. R. Brastrup (Multi-Mineral Products, Billings, Mont.), reporting for the membership committees, cited the work of the N.L.I. staff in the field which has resulted in consistent growth in active membership. The total for the two divisions of N.L.I. is now nearly 550 members.

Recommendations of the A.L.D. promotion and education committee were presented by the chairman, George A. Zeigler (M. J. Grove Lime Co., division of The Flintkote Co.). It was pointed out that promotion should be directed toward selling N.L.I. on the basis of the benefits inherent in its policies—effective conservation, equitable tax relief, and sound representation in Washington.

It was suggested that not only

(*Concluded on page* 127)

Also among the many directors present were R. Techau (Techau Limestone Co., Grand Mound, Iowa); G. Karch (The J. W. Karch Stone Co., Celina, Ohio); J. B. Mount (Maymead Lime Co., Shouns, Tenn.), past president and secretary-treasurer; W. L. Bryan (Bryan Rock Products, Inc., Shakopee, Minn.), past president; and J. M. Switzer (Frontier Stone Products, Inc., Lockport, N. Y.).



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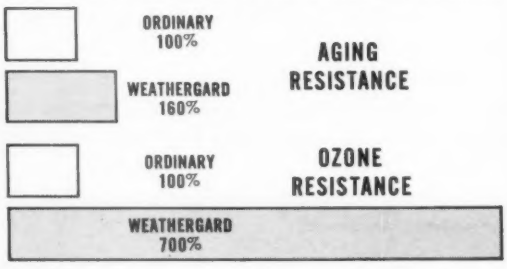

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Limestone Problems

(*Concluded from page* 124)

should more agricultural policy information be featured in the A.L.D. news releases, but also the over-all work of the N.L.I. could be more effectively publicized if news releases from both divisions were distributed together to various local news media throughout the country.

The latter conformed to recommendations of the C.L.D. committee as reported by its chairman, John Riddle (Riddle Quarries, Inc., Salina, Kans.), and the two monthly releases are being sent to individuals and the press as selected by the members of the division.

Use of the two N.L.I. highway films to greater advantage was urged. Also, with respect to activity in the highway field, the committee supports standardization of state specifications, particularly relative to gradation. Stronger recommendation to the Bureau of Public Roads for standardization of Interstate specifications was also proposed.

The specifications committee, headed by Paul Seitz (May Stone & Sand, Inc., Fort Wayne, Ind.), chairman, has been actively pursuing the latter objectives in meetings with Bureau of Public Roads personnel. Apparently the goal is in sight, because Bureau studies indicate that the majority of state specifications will fall within the range of AASHO specifications, and perhaps nominal revisions will result in complete conformance.

One of the primary problems the industry faces is reported slipperiness of limestone aggregates. As indicated by the research project committee chairman, Arthur R. Alvis (Alvis Limestone and Concrete Products, Butler, Mo.), the group is working with an A.S.T.M. committee on the problem, and criticism based on that reported characteristic is being combatted.

In his report to the joint board session, N.L.I. President Robert M. Koch commended the excellent cooperation rendered by the board members whenever called upon. This spirit of willing assistance has contributed materially to the increasing national stature and prestige of N.L.I.

Industry problems have already been faced successfully, it was noted, and there is good reason for optimism on those who currently face problems in the areas of depletion, ACP, and specifications. Considerable work lies ahead in the highway field—with commensurate potential benefit to the industry—and the association is already recognized for its strong role in progress of the highway program.

At the same time, Mr. Koch stated, the activity in the highway program field has not minimized the association's consistent promotion effort for more extensive conservation through agricultural limestone. Growth of the ACP program is regarded as promising.

Among the areas in which the staff and N.L.I. officers will be expending more effort are: increased contacts with state highway officials, contacts with state ASC committees and the Department of Agriculture, plus percentage depletion and depreciation tax factors.

Prior to adjournment, the members of the board made official expression of friendship and sympathy to the families of two recently deceased colleagues—J. F. Pace (Pace Construction Co., Glasgow, Ky.), and B. V. "Boots" Everett (Everett Quarries, Inc., Plattsburg, Mo.). Mrs. B. V. Everett has retained active management of the company organized by her husband, and has been nominated to assume his chair on the N.L.I. board.

1960 4th Qtr. Gypsum Output Declines from 1959 Figure

Crude gypsum mined in the United States during the fourth quarter of 1960 was 11 percent below output for the same period in 1959, according to reports made by producers to the U. S. Bureau of Mines. Imports of gypsum decreased 7 percent in the fourth quarter of 1960 from a year ago. The 1960 fourth quarter apparent crude gypsum supply totaled 3,867,136 short tons, which comprised 2,358,252 tons mined and 1,508,884 tons imported.

An 11 percent drop in the use of gypsum as a cement retarder was noted in the 1960 fourth quarter, compared with the same period in 1959. Production of base-coat plasters continued to decline. Most industrial and all building plasters sold in the last quarter of 1960 were well below those for the same period in 1959; and of the prefabricated products, only wallboard and laminated boards increased over the 1959 quarter.

Since the sales of finished gypsum products for the most part fluctuate with the building industry, industrial activity in gypsum in 1960 was generally lower than in the previous year. Domestic output dropped 10 percent and imports 13 percent from 1959. The crude gypsum supply of 15,141,697 short tons comprised 9,835,880 tons mined in the United States and 5,305,817 tons imported. Output of crude gypsum, which in the first quarter of 1960 was 19 percent below the fourth quarter of 1959, increased through the third quarter, then declined in the fourth quarter.

Uncalcined gypsum products sold or used in 1960 amounted to 3,659,896 tons, compared to 3,989,366 tons in 1959, an 8 prcent decrease. The manufacture of portland cement consumed 69 percent of the 1960 quantity.

Calcined gypsum produced during the year dropped 7 percent—from 9,268,282 tons in 1959 to 8,590,763 tons. The manufacture of plasters from industrial products consumed 284,644 tons, or 3 percent. Plasters for building purposes totaled 2,392,576 tons, a decrease of 11 percent from those similarly sold or used in 1959.

Output of prefabricated gypsum products declined 8 percent in 1960 from the previous year. Of these, only laminated board increased in use.

W. E. Williams, Inc., has acquired a plant and a 225-acre tract near Lenox Dale, Mass., from the Berkshire Gravel Company. The latter concern will continue to operate its transit-mix plant at Lenox Dale. Berkshire also operates a gravel plant at Pittsfield, Mass.

new British blast-furnace slag plant turns out products for varied uses

Steady, high-volume output results from careful preplanning

A NEW blast-furnace slag and coating plant with several interesting features has recently been placed in operation at Margam, Port Talbot, Glamorgan, Britain, by the Margam Slag Company. This operation, a joint venture of the Steel Company of Wales and George Wimpey & Company Ltd., of London, England, has a design capacity of 110 t.p.h. throughout all sections.

Three types of materials will be produced: (1) air-cooled slag suitable for use as a roadstone, a concrete aggregate, filter media, and railway ballast; (2) granulated slag for portland cement manufacture; and (3) foamed slag for building construction. Margam slag, according to tests carried out by the Stanger Laboratory on resistance to skidding, is claimed to have the particularly high value of 0.7 for polished stone coefficient.

Formed in 1959, the new company started entirely from scratch in the design and construction of its plant for slag disposal and slag processing at the Abbey Works of the Steel Company of Wales, where the five blast furnaces produce 16,500 tons of slag each week. Planning of the plant was directed toward satisfying the very large hourly demands which can be made upon a mixing plant for road finishing

By J. GRINDROD

requirements, and to make possible the steady production and flow of a limited number of slag sizes to permit road construction to proceed smoothly and consistently.

At the same time, the standard range of production sizes has been made sufficiently wide to enable any customer to select a product suitable for his needs. For instance, the storage capacity at the plant is such that it can provide enough of the larger sizes, suitable for combining as filter media or railway ballast, for a trainload of 400 tons.

Preplanning was the essence of all the construction operations in connection with the project, which was completed in less than a year. The Civil Engineering Department of the Steel Company of Wales was responsible for the site filling and reclamation of the sand dune area upon which the plant is built. The foundations and buildings were constructed by the Wimpey region office at Cardiff. Plant design, construction, and erection was the responsibility of Stothart and Pitt; and the electrical design and installation was by the Wimpey Electrical Division.

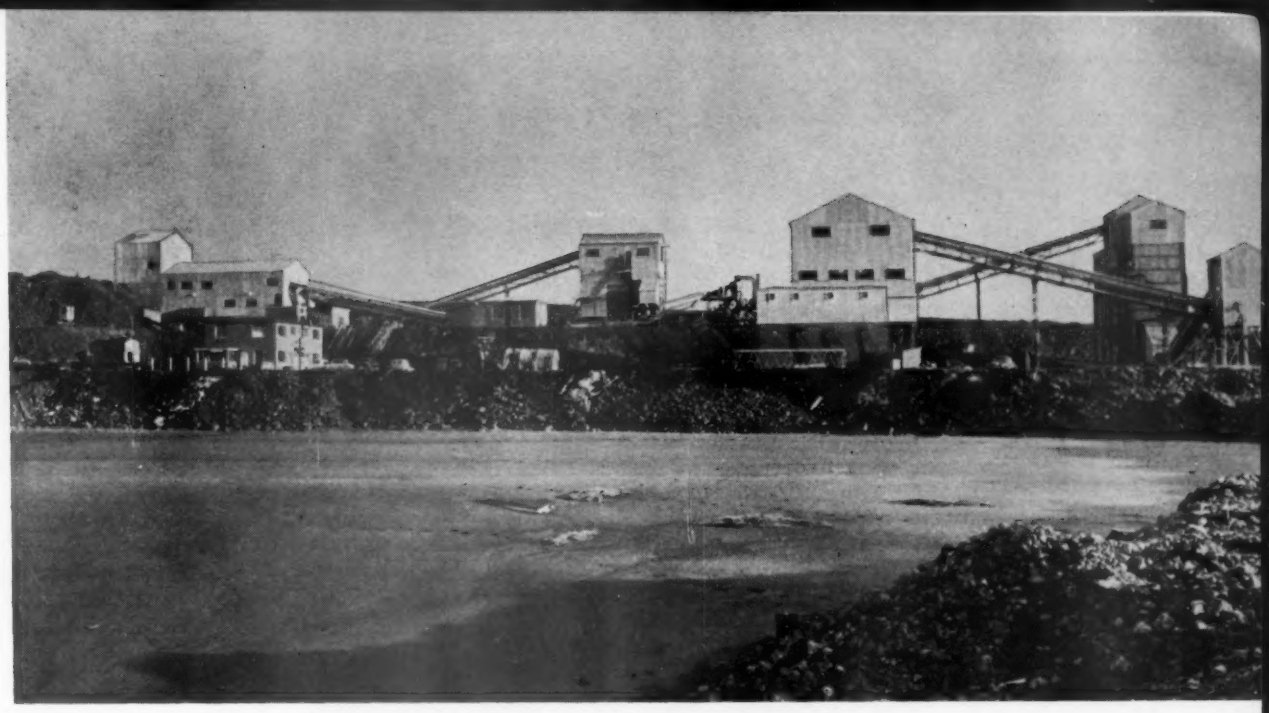
Blast furnace operation at the Margam steelworks is controlled day and night, and the iron quality within the furnace is also controlled by frequent analysis of the slag in order to obtain consistent production. Selection of high-quality slag is carried out by the blast-furnace staff, and the molten material is delivered to specially prepared slag banks. Here, the slag is tipped and spread with great care in 2-in. layers to ensure the production of a dense, uniform material.

After the slag has been allowed to air-cool, it is dug out by Ruston-Bucyrus 54 RB and 43 RB excavators and transported by specially designed 12-ton AEC dumpers to the 25-ton (nominal) capacity plant receiving hopper.

The plant itself consists of four main units interconnected by almost a quarter of a mile of conveyor lines. The units include the crusher house, the selector screening unit, the main screening and storage unit, and the mixer house. Additional buildings include the administration block, the electricity sub-station, and the workshops.

During the design stage of the plant, a number of points had to be given detailed consideration. For example, three-stage crushing was decided upon so that the particle shape of the processed material would be of the highest quality for roadstone. There were also special reasons for installing the metal extraction equipment before the primary crusher; and theoretical and practical considerations influenced the choice of the selector screening unit, the main storage unit, and the mixing unit.

As shown by work carried out at



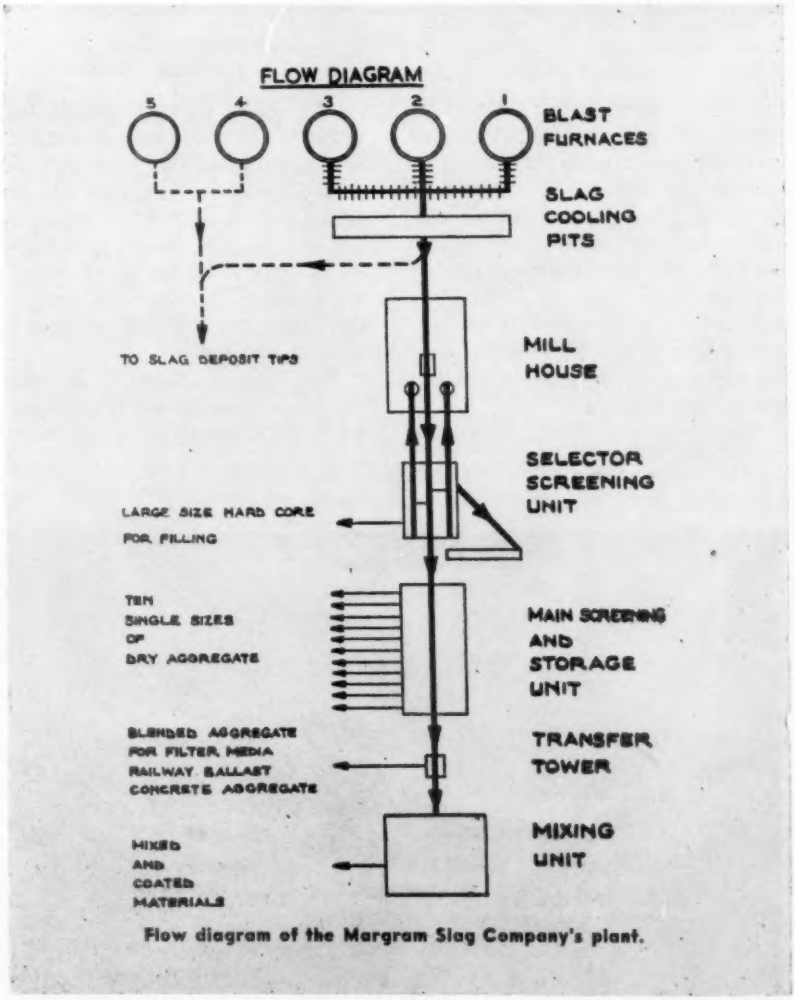
In this view the entire Margam Slag Co. setup is seen. From the left—the crusher house, the selector screening unit, the main screening and storage unit, and the mixer house. These structures are connected by nearly a quarter of a mile of conveyor belts.

the Road Research Laboratory in Britain, the dominant factor in obtaining a good particle shape is the crusher. The lower the reduction ratio used, the more satisfactory the resultant shape of the particle. This consideration, combined with the fact that high reduction ratios adversely affect the output of a given crusher, led to the adoption of three-stage crushing at Margam.

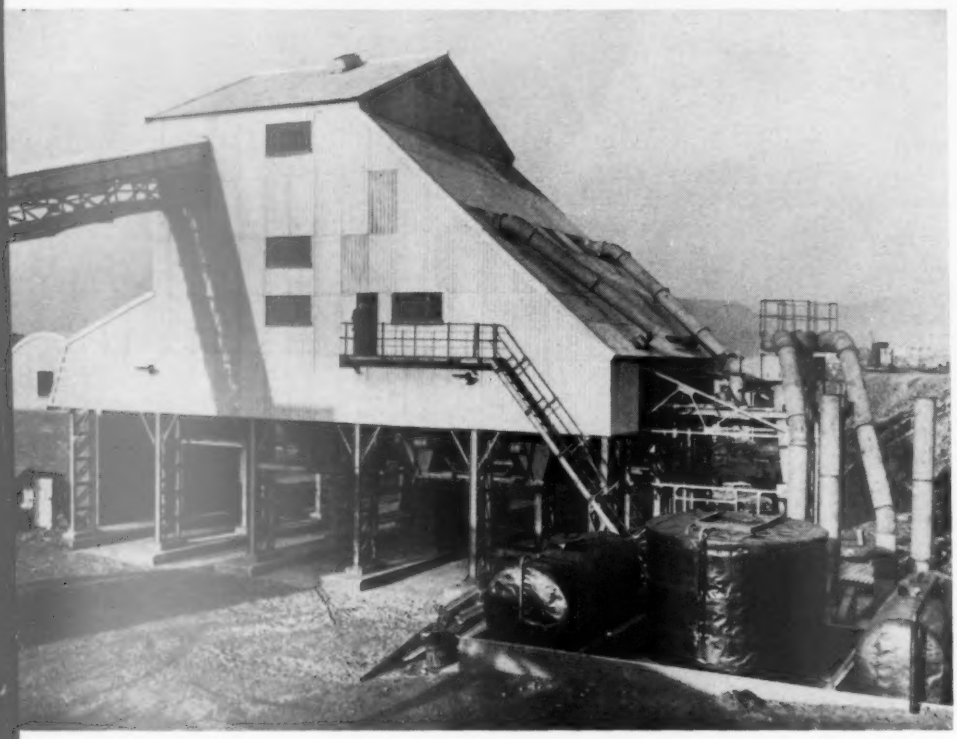
When the furnaces are tapped in the steelworks, small quantities of very thin metal are bound to find their way into the ladles with the slag. This is quite brittle and tends to break up when the slag is dug out of the cooling banks. To remove this metal, the extraction magnet has been placed in front of the primary crusher. Although this procedure affords protection to the crusher, it has necessitated the installation of a magnet large enough in size to pick up sizable lumps of slag to which the metal might be adhering.

More than half of the broken slag from the cooling banks comes to the primary crusher in pieces between 2½ in. and 12 in., and there are some thin slab pieces up to 18 in.

To deal with this situation with-



Flow diagram of the Margram Slag Company's plant.



Left: The mixing plant consists of two heating and mixing units, arranged side by side. Three types and grades of binder are stored in heaters having thermostatic temperature control.

Right: Facilities for batch-weighing of graded material from the storage unit. After weighing, the batch is preheated to the required temperature and delivered to the paddle mixer, where the selected binder is added.

out much stoppage due to blocking by oversize pieces, a 42x25 Kue-Ken primary jaw crusher has been installed. By setting this unit at 3 to 4 in. a reduction ratio of at least 41 is achieved, with a throughput of 110 t.p.h. Secondary and tertiary Symons cone crushers reduce the whole output to minus ¾-in. material, and of this 90 tons per hour is expected to be less than minus ½-in. material.

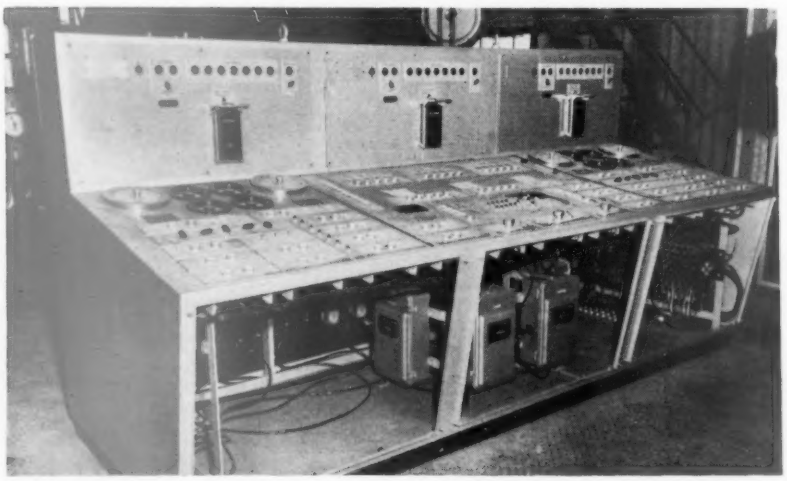
At the selector screening unit, a 5- by 16-ft. Symons double-deck screen, fitted above four 25-ton storage compartments, separates the crushed material into plus 2¼-in., minus 2¼-in. to plus 1¾-in., minus 1¾-in., to plus ¾-in., and minus ¾-in. sizes. A Locker electric vibrating feeder at the bottom of each bin discharges the screened material to various destinations.

Plus 2½-in. material is taken through a chute to a conveyor returning to the secondary crusher. Minus 2¼- to plus 1¾-in. material and minus 1¾-in. to plus ¾-in. material each pass through a bifurcated chute equipped with a thruster-operated flap to another conveyor for return to the tertiary crusher.

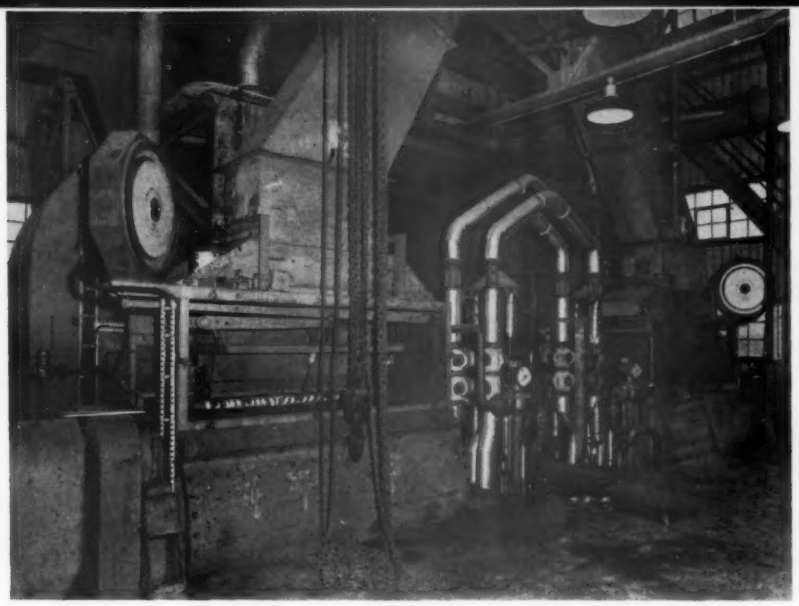
Alternatively, these materials can be returned to a conveyor delivering to the main screening unit. The latter conveyor also handles the screenings from the minus ¾-in. compartment of the selector screening unit. An additional feeder at this compartment can discharge the minus ¾-in. material for diversion to the rotary drier.

This system makes possible the reduction of the entire output to minus ¾-in. size or, as required, the maximum retention of minus 1¾-in. to plus ¾-in. size.

A two-stage drying and heating system has been adopted at Margam whereby any wet screened material can receive initial treatment in a rotary drier before having the final moisture extracted in the mixer unit batch heater. This system also per-



The electronic control desk with its front panels removed.



mits more consistent and easier screening of the smaller sizes.

A withdrawable capacity of 1,200 tons in all was fixed for the Margam screening and storage unit, which has been equipped with ten divisions to serve the sizes listed in the British Standard No. 63. A minimum storage of 100 tons for each size was decided upon, with up to 400-ton storage for these larger sizes suitable for combining as filter media or railway ballast. Up to 2½-in. size was considered as likely to be demanded for road construction material, whether in the form of coated slag or as wet-mix base material.

Screening by rejection is used primarily, since the screens are used to distribute the material along the length of the bins without the need for any of the complicated chutes necessary in screening by selection. The four screens are all 4- by 14-ft. Symons single-deck units. The first separates the material into ±¾-in. sizes before it passes to the final screens, so as to ensure screening efficiency. Automatic proportioners beneath the reception bins batch the aggregate to an accuracy of ±¾ percent, although each individual can be withdrawn separately if required.

At the coating plant there are two 60-cu. ft. capacity heating and mixing units arranged side by side. Graded batches of material from the storage unit are delivered into one or the other of the two weigh hoppers, which checkweigh the complete batch. After being preheated to the correct temperature, the batch is delivered to the paddle mixer, where the selected binder is added. Filler and flux oil can also be added, if required. The mixed batch may then be discharged directly into lorries or into one of six 18-ton mixed-material traveling hoppers.

Three types and grades of binder are stored in Clarmac heaters with thermostatically controlled temperature. The entire mixing process is fully automatic and is controlled from a Dewhurst electronic control desk. The operator in charge of mixing is supplied with the prearranged grading tablets set up by the laboratory technician, to ensure that all batches of any given specification are absolutely identical. The selection of binder type, filler, and temperature are all by push-button control.

In the batch proportioning system three proportioners can run together. In addition to controlling the timing unit, which generates pulses at time intervals equivalent to that for delivery of 2½ percent of a batch, the electronic equipment scans the program tablet, switching the proportioners on and off in the desired sequence.

The program tablet itself takes the form of a large multipin plug in which pins can be removed or positioned in different places. For each proportioner there are two pins, the first controlling the position in the proportioning cycle at which the proportioner is started and the second the position in the cycle at which the proportioner is stopped. (The distance between the pins represents the time the proportioner runs.) In this way precise specifications can be achieved.

This installation is designed to be fully capable of supplying all the requirements of three mechanical road finishers, which consume 200 to 300 t.p.d. for efficient operation, and also a number of hand-laying gangs.

Revised Gypsum Standards Issued in A.S.T.M. Manual

Publication of the 1960 edition of the *Compilation of A.S.T.M. Standards on Gypsum Products and Plaster Aggregates* has been announced by the American Society for Testing Materials. The 152-page volume contains specifications, methods of test, definitions relating to gypsum products and plaster aggregates, and related standards.

Material added since the preceding edition includes data on gypsum backing board and the test method for surface burning characteristics of building materials. Several revisions also were made.

Copies may be obtained from A.S.T.M. headquarters, 1916 Race Street, Philadelphia 3 Pa., at $2.75 each.

Hazard Hunting is the title of a new booklet issued by the National Safety Council for distribution to promote off-the-job safety. The illustrated folder shows how to hunt down and destroy accident hazards in the home, out of doors, and on the highway. Information and a sample copy available from the National Safety Council, 425 N. Michigan Avenue, Chicago 11, Ill.

A new quarry reportedly assuring 200 million tons of limestone reserves has been opened by Drummond Dolomite, Inc., Sheboygan, Wis., on the south shore of Drummond Island in Michigan.

Drill hardest rock faster and cheaper with Schramm Hi-Pressure Rotadrills

Here is the Schramm answer to the search for economical drilling in extremely hard rock. Faster penetration rates . . . lower operating costs than with ordinary equipment. New Schramm Series "H" Rotadrills use a 250 PSI compressor to provide drilling energy where it does the work . . . on the bottom of the hole with a Hi-Pressure rotary percussion tool. Because it packs more power, and delivers it with a more efficient punch, a Series "H" Rotadrill gives you more productive drilling every hour it's in hard rock. Flexible too . . . they may be operated at normal drilling pressures for rotary or drag bit drilling.

Hi-Pressure Rotadrills are available truck mounted, Pneumatractor mounted, crawler mounted or as do-it-yourself units on trucks or tractors. Adaptability to your needs . . . economy of operation . . . job-proved low maintenance . . . your total air power problem has been thoroughly worked out. As it has with every member of the industry's most complete line of Co-ordinated Air Power equipment. When all the costs are in, you've bought more equipment with fewer dollars when you buy Schramm. Write Schramm, Inc., 640 North Garfield Ave., West Chester, Pa.

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CO-ORDINATED AIR POWER

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Obituaries

STANLEY V. KUDRON, operator of the Westfork Sand and Gravel Company, Sioux City, Iowa, was killed almost instantaneously in an accident on Highway 20. Mr. Kudron was thrown from a pickup truck which overturned near Sioux City.

CHARLES DUNCAN WARNER, 60, owner and operator of C. D. Warner & Sons, Inc., Modesto, Calif., died recently of a heart seizure in his home. Mr. Warner had operated the sand and gravel plant for 34 years.

J. MILLER ESHLEMAN, 72 founder of J. Miller Eshleman & Son, Inc., crushed stone producers, Landisville, Pa., died recently at his office. Mr. Eshleman opened his quarry business in 1930.

ERNEST G. PHIPPS, 77, secretary-treasurer of the Valders Lime and Stone Company, Valders, Wis., for the last 10 years, died in a Manitowoc hospital.

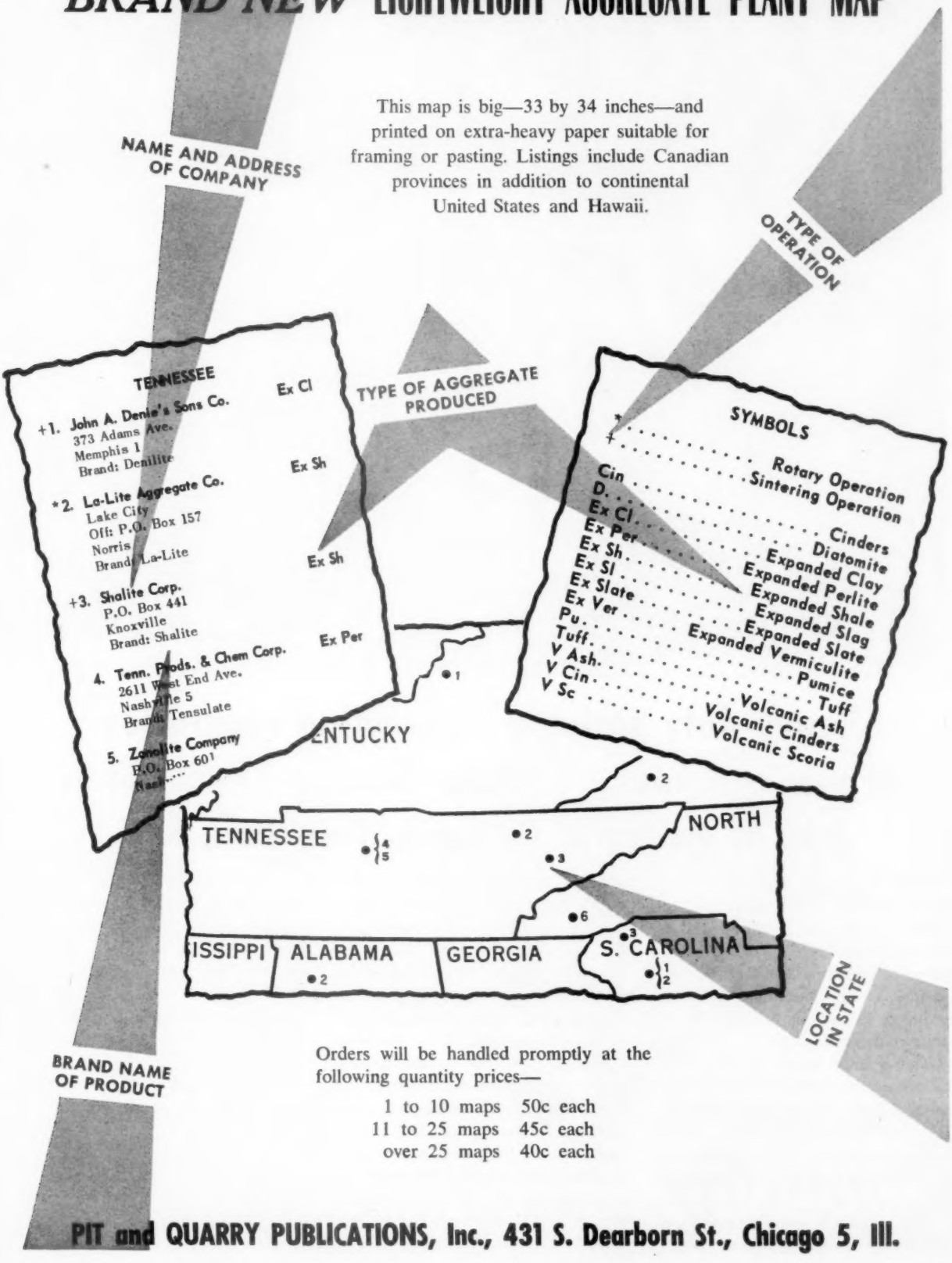
ROBERT P. BREMNER, 71, vice-president and sales manager of the industrial division of the T. L. Smith Company, Milwaukee, Wis., died of a heart ailment in his home. He has been in semiretirement since a year ago, but had continued to serve the company as a consultant.

Mr. Bremner has been with T. L. Smith since 1923. In 1926 he joined the Petoskey Portland Cement Company as a salesman, but returned to Smith in 1944 as general sales manager. In 1956 he was made a vice-president.

PAUL W. IRELAN, a partner in the Grand River Limestone Company, Grand River, Iowa, died recently after a heart attack in a local hospital. He was a member of the Iowa Limestone Producers Association, Inc.

Here's what you'll find on Pit and Quarry's
BRAND NEW LIGHTWEIGHT AGGREGATE PLANT MAP

This map is big—33 by 34 inches—and printed on extra-heavy paper suitable for framing or pasting. Listings include Canadian provinces in addition to continental United States and Hawaii.



Orders will be handled promptly at the following quantity prices—

1 to 10 maps	50c each
11 to 25 maps	45c each
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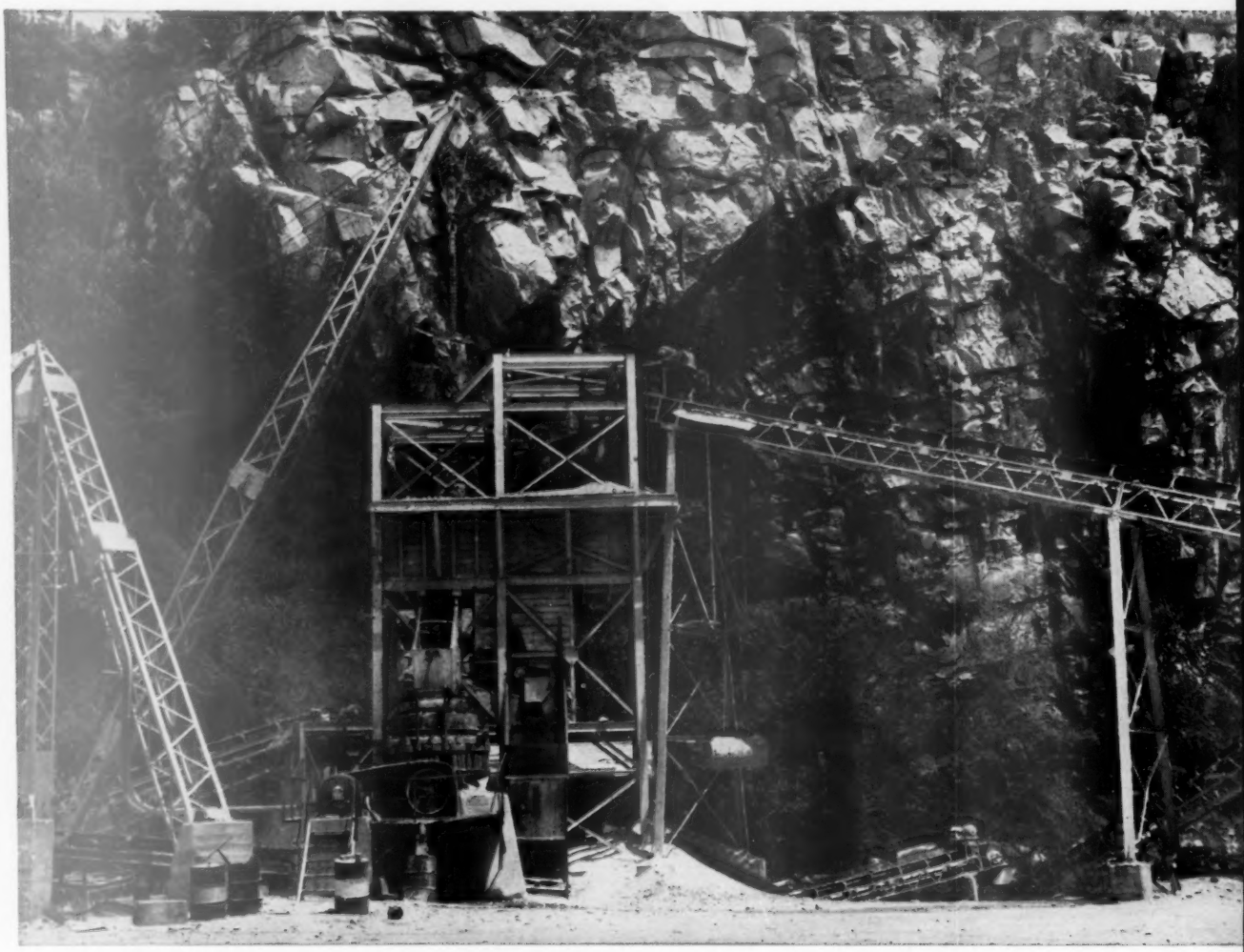


Heavy-duty scalping . . . exacting separation of medium fines . . . Deister Screens handle both jobs at Palmetto Quarries, Columbia, S. C.

One of the South's largest and finest crushed granite plants is operated by Palmetto Quarries Company at Columbia, South Carolina. This plant—together with two smaller Palmetto plants, Stoney Point and Blair—produces almost one million tons of high-grade crushed granite annually.

The granite ledge at Palmetto's Columbia plant consists of hard stone that has been excavated to a depth of 200 feet. In this pit, which covers some 20 acres, is "the hardest-working vibrating screen in the plant"—a Deister scalper.

Every hour, the entire plant load—an average of more than 350 tons of stone—feeds from the silo onto this double-deck 5′ x 10′ Type UHS Deister. Placed in operation five years ago, the scalper is equipped with 2½″ openings on the top deck and 2″ openings on the bottom.

From D. K. Corley, Superintendent of all Palmetto Quarries operations, comes this estimate of the Deister scalper's performance: "For five straight years this screen has been working an average of ten hours a day, handling 300 tons an hour or better. In all this time, we have never had a minute's trouble. The only maintenance costs have been for screen cloth."

Another Deister Screen, a double-deck 3′ x 10′ Type UHS, serves as a scalper at Palmetto's Stoney Point plant. It has 4″ openings in the upper deck and 2½″ openings in the lower. To meet current demand, this plant is running at full capacity, and the entire plant load of 225 tons per hour goes across the Deister scalper.

Plant Superintendent Charles Scott says: "The load on the screen's top

Superintendent of all Palmetto Quarries operations is D. K. Corley, shown here beside the company's newest Deister Type UHS Screen. Note how the fully enclosed Spring and Rubber Mount suspension system is protected from accumulated stone dust and chips.

deck is terrific with a heavy proportion of pieces between 10" and 14" in size. I'm impressed by the way this scalper can take such a beating day after day and still keep working away. We have to replace the 4" screen cloth on the top deck about every two weeks. It's an easy job on the Deister though . . . takes about 30 minutes."

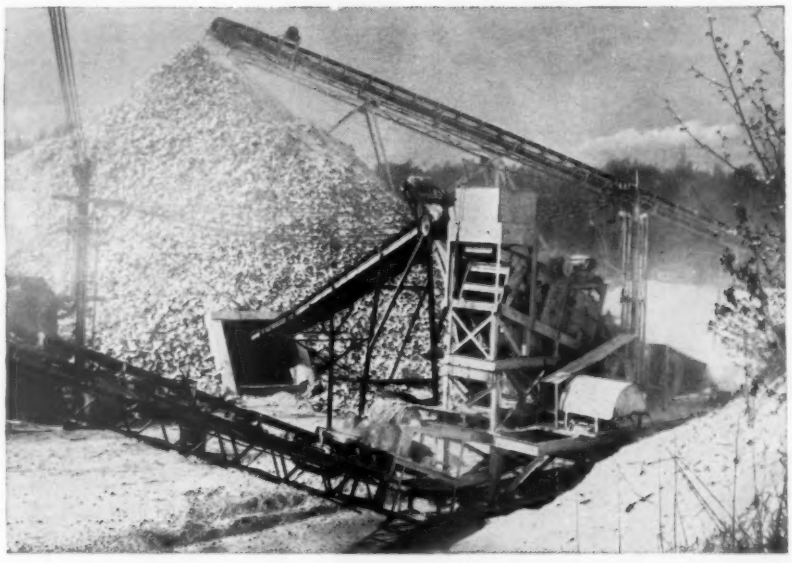
Newest screen at Palmetto is a single-deck 5' x 10' Type UHS Deister handling medium fines. This screen has given uninterrupted service for over a year. Equipped with ½" screen cloth, it is doing an exacting job in producing ½" material from ¾" material.

A noteworthy feature of this screen is the Deister suspension system featuring ENCLOSED Spring-&-Rubber MOUNTS. Each mount incorporates a heavy coil spring working in conjunction with a solid rubber isolator to eliminate the transmission of vibration to the supporting structure.

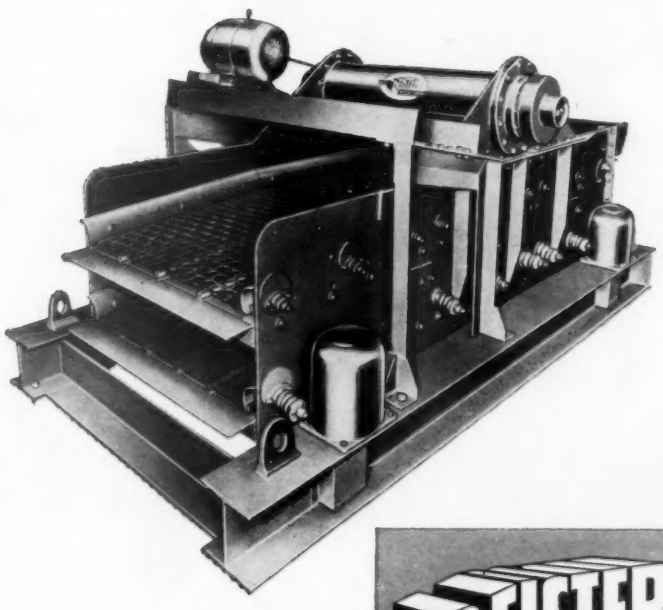
Company President George Lott, Jr. sums up the case for Deister at Palmetto: "Since our first Deister installation in 1956, all the new screens we have bought have been Deisters. Needless to say we're highly pleased with their accuracy, durability and all-around performance."

Palmetto Quarries is one of hundreds of aggregate plants which are using Deister Screens to boost output and reduce maintenance on every type of job from heavy scalping to production of extreme fines. Deister engineers will be glad to show you how your plant can reap the same benefits.

GEORGE LOTT, JR.
President of Palmetto Quarries Company



This is Palmetto's Stoney Point plant, where a double-deck Deister Scalper handles 225 tons per hour to keep production at full capacity.



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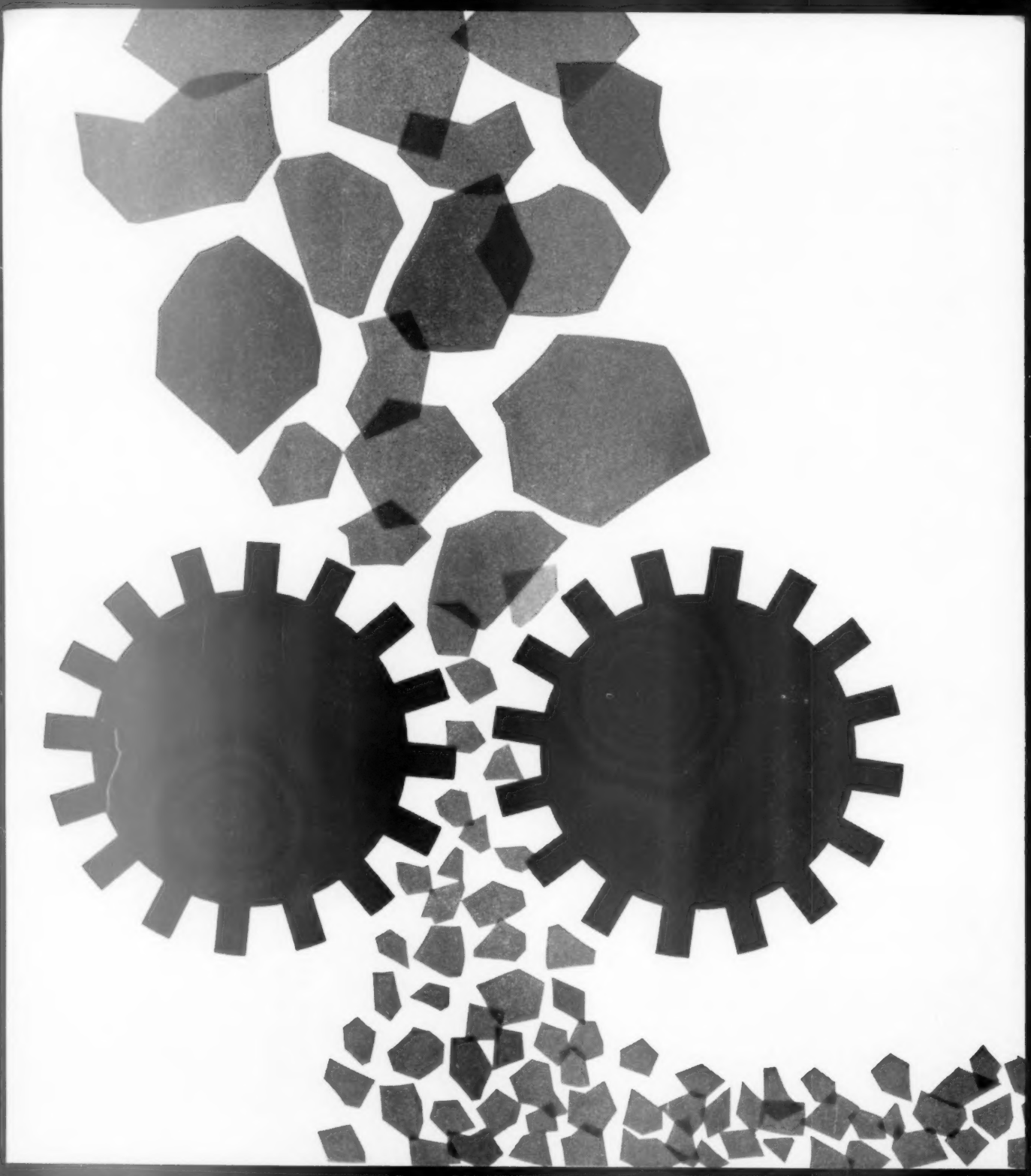


TUFFMASTER WOVEN CARCASS BELTS SHOW OUTSTANDING ECONOMY IN CRUSHER OPERATIONS

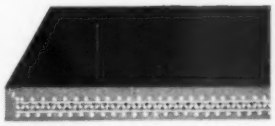
In handling 6″ to 8″ aggregate in short or extra long spans, Thermoid's new rubber covered, *woven-carcass* conveyor belt lasts 10-20% longer, yet costs no more than plied belts of similar quality and strength.

In addition, TUFFMASTER has these additional woven-carcass advantages: greater resistance to ripping and edge wear—greater impact absorption—superior fastener holding—superior troughability.

In constructing this superior belting, before the cover is applied the double woven cotton and nylon carcass is specially impregnated for superior cover adhesion. After complete assembly, each belt length is heat cured under tension to limit belt stretch to less than 3%. As a result, TUFFMASTER outlasts, outperforms all comparable belts. Available in Victor (natural rubber) or Ebonite (GRS) covers, ½″, ⅜″ and ¼″ thick. Belt widths 18″ to 48″, with 30″ and 36″ standard stock.

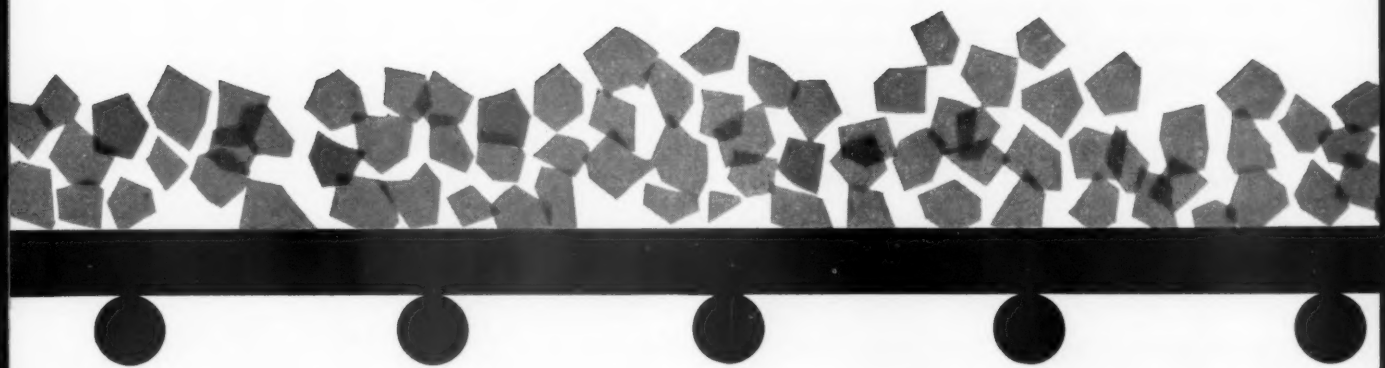
Call your Thermoid Big T distributor today for additional information on the many advantages of this long wearing, abrasion resistant belt for quarrying or rock handling operations. He also handles other Thermoid belts and industrial hose in types to fit every job.

Quaker Thermoid



Cross section shows the heavy cotton and nylon woven construction; stranded cotton and nylon yarn in the filler for superior fastener holding and rip and edge wear resistance; nylon cord longitudinal binders for added strength.

KEEP JOBS MOVING WITH THERMOID BIG T CONVEYOR BELTS



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"...The most efficient gravel washer and trash separator yet developed"

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Dredge "STANDARD," Tri-State Materials Corp.
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The OPERATING PERSONNEL & MANAGEMENT state:

The FUEL PROCESS GRAVEL WASHER occupies a small space and can easily be installed on your unloading dock. Recent dock-side installations include: Bedford Nugent Sand Company, Evansville, Ind.; Ohio River Sand Company, Louisville, Ky. Dredge installations include: Tri-State Materials Corp., Parkersburg, W. Va.; Kanawha Sand Company, Parkersburg, W. Va.; Ohio River Sand & Gravel Co., New Martinsville, W. Va.; Iron City Sand & Gravel Co., Pittsburgh, Pa.

Our engineers are available to assist you in every possible manner. Write for full details so that you can also benefit from greater efficiency and lower production costs.

For most installations this unit washes out trash, coal and other extraneous material with water as the separating media—but heavy media can also be used.

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There is no mistaking the Reo Half Cab. Designed for efficiency, safety, comfort, visibility and light weight, the Half Cab breaks radically from conventional design, yet maintains a clean, functional appearance free of the "gingerbread", frills and weight increasing expanses of sheet metal.

Half Cab

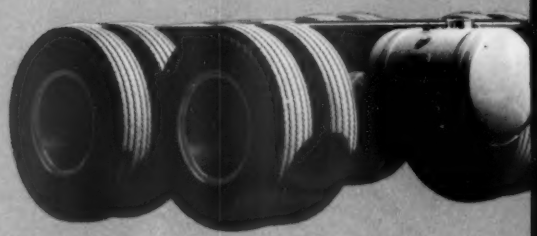
NEW TO THE REO LINE OF QUALITY MOTOR TRUCKS

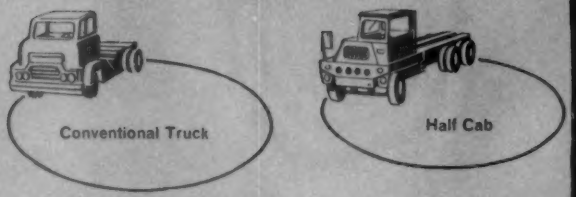
ANOTHER REO MONEY-MAKER FOR THE CONSTRUCTION INDUSTRY

Reo, the standard for the construction industry, introduces four models in a new Half Cab series—the DO-430 and the DO-530 with steel cab, deck and hood and the DOL-436 and DOL-536 with payload adding aluminum cab, deck and hood.

The Half Cab series is engineered for increased maneuverability, better weight distribution, increased engine and transmission accessibility and unexcelled driver comfort and visibility.

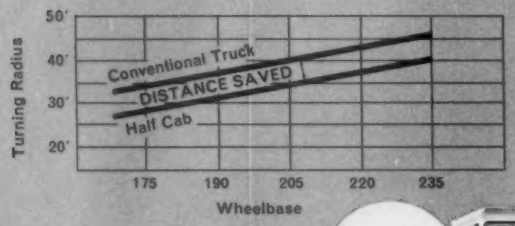
These features together with Reo's traditional power train components of tandem axles, result in a truck that fully meets Reo's exacting standards for the construction industry.





MANEUVERABILITY

The Reo Half Cab with its widest track front axle is engineered specifically for those operations demanding extra maneuverability. With power steering, the additional cramp angle of the half cab cuts 5½ feet off the turning radius of a 175-inch wheelbase model . . . even more on longer wheelbase models.



VISIBILITY

The driver, virtually surrounded by glass (a full 3,016 square inches) sits high above traffic and, with no hood to obstruct vision, sees exactly where he is driving, both enroute to and at the job site. Less maneuvering saves valuable minutes and means less wear on equipment.

REO

A CAB OF DISTINCTION

There is no mistaking the Reo Half Cab. Designed for efficiency, safety, comfort, visibility and light weight, the Half Cab breaks radically from conventional design, yet maintains a clean, functional appearance free of the "gingerbread", frills and weight increasing expanses of sheet metal.

ACCESSIBLE

Engine and transmission are out-in-the-open with the unique Reo Half Cab forward tilting engine cover. Maintenance and repairs are far easier than with conventional units. Fender platform furnishes plenty of room for the mechanic. A real time and money saving feature.

COMFORTABLE

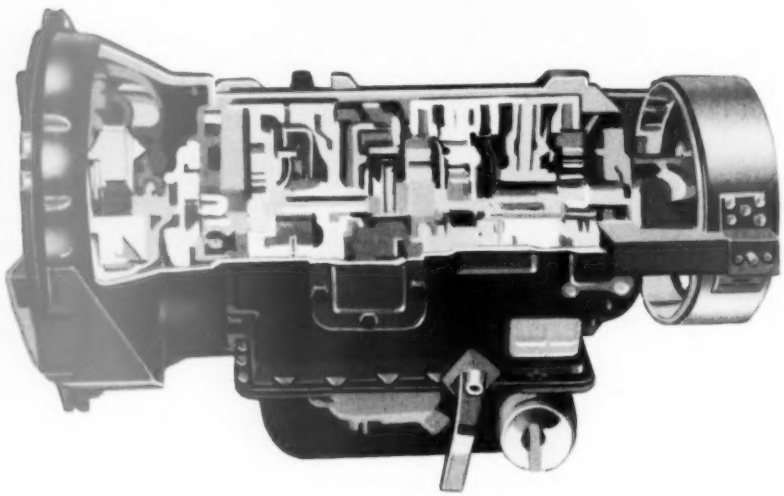
The One Man Cab is driver designed for comfort, safety and visibility. Driver controlled front, side and ceiling ventilators assure a constant supply of clean fresh air. Controls and instruments are easily accessible to insure driver efficiency. Bostrom seat increases comfort and reduces fatigue.

POWERFUL

Reo, the most honored name in gasoline truck engines, powers the Half Cab with the Gold Comet O.H. 170 or the O.H. 185 engine. Short stroke "wet-sleeve" construction means more working power and economical engine maintenance. For power, payload and unequalled performance, look to Reo Gold Comet engines.

A PROVEN OPTION

ReoMatic transmission eliminates the clutch pedal and takes the guesswork out of shifting. Fully proven under the most rugged conditions, ReoMatic automatically selects the most efficient gear ratio in each drive range. Eliminates lugging and lessens chance for shock load damage to drive line components. Prolongs engine life, cuts downtime, reduces maintenance, speeds operating schedules.

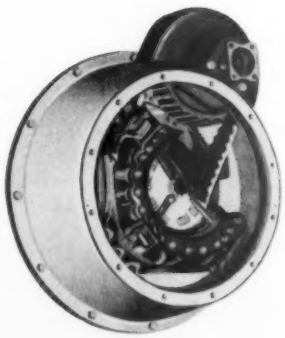


Standard Components

	DO-430 DO-530	DOL-436 DOL-536
GVW	43,000 lbs. to 50,000 lbs.	48,000 lbs. to 55,000 lbs.
Wheelbase	175" to 235"	175" to 235"
Engine	O.H.170	O.H.185
Main Transmission	300V	300V
Aux. Transmission	7231D	7231D
Clutch	13"	14"
Front Axle	FE-900	FE-15
Rear Axle	SLHD tandem (DO-430) SQHD tandem (DO-530)	SLHD tandem (DOL-436) SQHD tandem (DOL-536)
Brakes	Full air	Full Air
Tires	Front: 9.00x20 Rear: 9.00x20	Front 11.9x20 Rear 9.00x20
Steering	HPS-71	HPS-71
Fuel Tank	40 gal. side	40 gal. side
Seat	Bostrom #60	Bostrom #60

POWER TAKE-OFF OPTION

Reo's field proven Flywheel Power Take-Off is the answer in mixer operations. Light in weight, economical and, most important, proven by more than a million hours use of the toughest construction jobs in the country. Flywheel P-T-O means hundreds of pounds of additional payload and smooth direct power at low cost . . . a bonus plus with Reo.



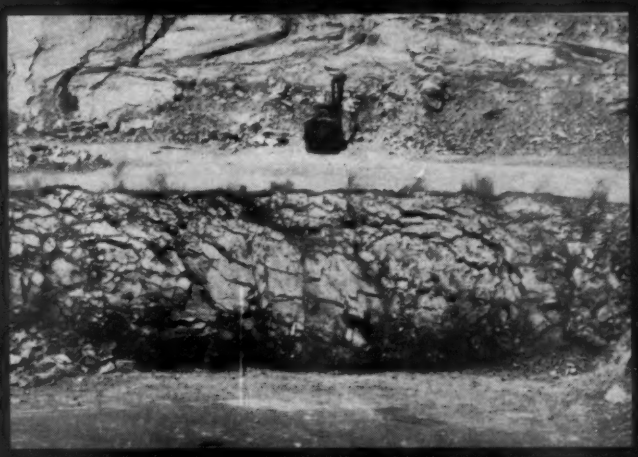
Design of the Half Cab with its long CA for a given wheelbase makes it practical in many states to shift hundreds of pounds of additional payload weight to the front axle. Profits increase through Reo Payload Engineering. Front axle location makes the Half Cab ideal for bridge formula states.

REO MOTOR TRUCK DIVISION

THE WHITE MOTOR COMPANY, LANSING 20, MICHIGAN

7-61

10 ways Du Pont can help you break more rock per dollar



It's not the cost of loading a hole that counts in quarry blasting . . . it's the cost of getting out a ton of rock.

That's why the really successful quarry men look long and hard for top quality explosives.

And it's why so many of them turn to their Du Pont representative or distributor for a complete choice of quality products . . . to take the guesswork out of every shot.

Have you looked into the advantages of these Du Pont products when used in your operations?

1 **DU PONT "NILITE" 101 and 202:** New low-priced free-running blasting agents of medium density, ideally suited for dry holes from 2" diameter up. No field mixing; Du Pont quality performance, shot after shot.

2 **DU PONT "NITRAMITE" FR:** Free-running nitro-carbo-nitrate higher in density than the "Nilite" grades. Can be poured readily into wagon-drill holes as small as 2" in diameter.

3 **DU PONT "NITRAMITE" 1 and 2:** Quality non-cap-sensitive blasting agents which sell at reduced prices because they come in water-resistant fiber-board tubes instead of metal cans.

4 **DU PONT "NITRAMON":** The premium quality non-cap-sensitive blasting agent, packed in sealed metal containers to provide maximum water resistance. The ultimate in safety and dependability for modern quarry blasting.

5 **NEW DU PONT HDP PRIMERS:** High detonation pressure primers in 1-, ½-, and ⅓-pound sizes. Specially made to detonate nitro-carbo-nitrates, "Tovex" gelatin, and prill/oil mixtures.

6 **NEW DU PONT "TOVEX":** High velocity non-NG gelatin. Gives higher borehole density than most products on the market. Gives excellent results in hard, massive rock.

7 **DU PONT DYNAMITES:** A complete line of dynamites for every blasting need — each product manufactured to the rigid quality standard demanded at Du Pont.

8 **NEW LOW ENERGY DETONATING CORD (LEDC):** Greatly reduces noise of blasting. No need to bury trunk lines. 150 feet of LEDC makes no more noise than one electric blasting cap . . . or two inches of "Primacord".

9 **DU PONT BLASTING SUPPLIES:** A complete line. Blasting caps — Electric blasting caps — MS (Millisecond) Delay and the new "Acudet" Delay Electric Blasting Caps — "Primacord" MS Connectors in three delay intervals.

10 **DU PONT BLASTING ACCESSORIES:** Push down and condenser discharge blasting machines—Voltohmeters—Rheostats.

Your Du Pont Explosives Department representative or distributor can supply further information or demonstrations of any of these products. Call him. Or write Du Pont, 2446 Nemours Building, Wilmington 98, Del.

Explosives DU PONT

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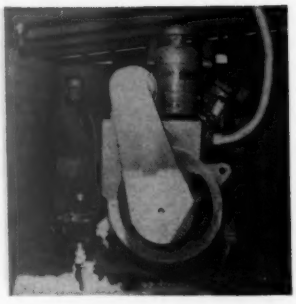
Better Things for Better Living . . . through Chemistry

engine power
BY CATERPILLAR

75% cut in fuel costs leads to purchase of second Cat Natural Gas Engine for increased quarry efficiency

The McClinton Bros. Limestone Quarry is located at Johnson, Arkansas, five miles north of Fayetteville. Products are dry white limestone, cement, asphalt and concrete mix, cement blocks, and aggregates. Caterpillar Engines have played a large part in increasing quarry efficiency.



Owner Clark C. McClinton beside the Cat G375 which furnishes power to drive the quarry's motors. His experience with this engine led him to the purchase of a second, the G342, for the impact breaker.

The new Cat G342 supplies power for an impact breaker. It replaced an electric motor and has proved to be more economical and more efficient for this operation.

Clark C. McClinton bought his first Caterpillar Diesel over 14 years ago. When he was ready with a modernization plan for his quarry at Fayetteville, Arkansas, he purchased a Cat G375 Natural Gas Electric Set for prime power. The result: 75% savings in fuel costs and maintenance outlays. In another step of his plan: an engine to power an impact breaker, Mr. McClinton did not have to make a choice. It had already been made for him by his experience with Caterpillar Engines, particularly the G375. "The fuel economy and low initial cost per horsepower convinced us that another Cat Natural Gas Engine would be a worthwhile addition to our quarry." In addition to replacing an electric motor for powering the impact breaker, the Cat G342 also eliminated the need for a transmission to vary the speed required for stone fineness.

The reason you get such dependability from Cat Natural Gas Engines is that they are built essentially as diesels—only the pistons and fuel systems have been changed for natural gas operation. This built-in diesel strength allows high compression ratios for high horsepower output and superior fuel economy. For the full story, see your Caterpillar Dealer. He can show you dramatic proof of the superiority of Caterpillar Natural Gas Engines. He's listed in the Yellow Pages. Or write Engine Division, Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR

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Engine Division, Caterpillar Tractor Co., Peoria, Ill.

Legal Decisions

On Industry Problems

By LEO T. PARKER

Attorney at Law
Cincinnati, Ohio

RECENTLY a reader wrote a letter containing the following inquiry: "I have been a constant reader of your interesting legal discussions in PIT AND QUARRY for many years. Now, I have a question which perhaps you can answer for the benefit of other readers and myself. Is a property owner liable on a mechanic's lien for improvements ordered by a tenant?"

The higher courts consistently have held that an ordinary tenant cannot subject the rented or leased premises to a mechanic's lien for work ordered by the tenant. On the other hand, a few weeks ago a higher court held that if the lease contract between the building owner and the tenant obligates the latter to make improvements, the tenant is considered an authorized agent of the building owner and he can subject the premises to a mechanic's lien.

For illustration, in *Winegardner Company* v. *Bunch,* 333 S. W. (2d) 787, the testimony showed that a man named Bunch owned a business building which he leased to a tenant. The lease contract contained a clause that obligated the tenant to make certain improvements on the building. Later the tenant made a contract with the Winegardner Company to do certain work for $6,100.00. When Bunch failed to pay the bill the Winegardner Company filed a mechanic's lien against the building.

During the trial the property owner contended that the mechanic's lien was void because he had not authorized the contractor to do the work. It is interesting to observe that the higher court held the lien valid, saying:

"Where the lease requires or obligates the tenant to construct improvements which substantially enhance the value of the freehold, the tenant is considered as having been authorized as agent of the owner for the purpose of subjecting the premises to a lien."

Law of Accord and Satisfaction

Recently an official of a concrete products company wrote an interesting letter, in part, as follows: "We have a customer who claims that our account showing that he owes $2,313.43 is incorrect. He sent us a check for $2,000.00, and wrote on the check 'Payment of my account in full.' If we cash this check can we sue and recover the balance $313.43?"

The answer is no. This is so because the higher courts consistently hold that when an account or claim is in dispute, and the debtor sends to his creditor a check or other remittance which he clearly states is in full payment of the claim, and the creditor accepts the remittance or collects the check without objection this constitutes a good "accord and satisfaction." In other words, the moment the creditor endorses and collects the check, with knowledge that it was offered only upon this condition, he thereby agrees to the condition and is estopped from denying such agreement. It is then that the minds of the parties meet and the contract of accord and satisfaction becomes complete.

See the leading case of *Continental Company* v. *Weinstein,* 267 S. W. (2d) 523. This court said:

"The law is well settled that when a creditor accepts from his debtor

no more downtime to replace connectors...

HANCO FLUX POWER SCREEN HEATERS

transmit power through the air!

With the all new Flux Power by Hanco all mechanical connections between transformer and screen are eliminated. The 0 to 4000 ampere current is transmitted through the air by inserting a conductor through the eye of the transformer. This permits unrestricted vibration, maximum power transmission and true screen balance.

5 YEAR GUARANTEE

★ Dust-tight, waterproof construction
★ Dual voltage, 220/440 volt
★ Use either plain or stainless cloth
★ Anti-magnetic steel side rails

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HANCO INTERNATIONAL
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a check containing a statement that it is in full satisfaction of his account, although for less than the amount demanded, it operates as an accord and satisfaction."

However, it is important to know that this is not the law if there is no dispute between the creditor and debtor relative to the amount due. Also, last month a higher court held that there is no "accord and satisfaction" and the debt is not cancelled if the payee writes on the check that it is not accepted as full payment, or if the payee writes or, otherwise, advises and informs the payor that the check is not being accepted as full payment of the debt.

For example, in *T. Concrete Pipe Company* v. *P. Concrete Pipe Company,* 330 S. W. (2d) 578, the testimony showed these facts: The P. Concrete Pipe Company was the successful bidder on a sewer contract for a town. The P. Concrete Pipe Company made arrangements to purchase the necessary pipe from the T. Concrete Pipe Company. The delivery of pipe for the job commenced on or about June 21, and continued periodically thereafter until October 16. On August 15, 1957, the P. Company remitted to the T. Concrete Pipe Company a check in the amount of $1,831.36. Attached to this check was a stub indicating a deduction of $203.49, without explanation. The disagreement, in respect to this and other payments, arose regarding a 10 percent discount, with the P. Concrete Pipe Company claiming that it was a custom of the trade in transactions between dealers.

In subsequent litigation, the higher court held that the acceptance and cashing of these checks by the T. Concrete Pipe Company was not "accord and satisfaction." In other words, cashing the checks by the T. Concrete Pipe Company did not relieve the P. Concrete Pipe Company from paying the full balance due. This court said:

"When the checks of defendant (P. Concrete Pipe Company) were received, the complainant (T. Concrete Pipe Company) immediately notified the defendant that it had not agreed to the 10 percent discount and later, that the amount of each check was being credited to the account and that the remaining 10 per cent would still be owing. It seems clear that if the defendant (P. Concrete Pipe Company) had made a distinct notation on the checks which were offered to the complainant (T. Concrete Pipe Company) that they were in full settlement of the balance owing, and that complainant, "without objection," had cashed said checks, there would have been an accord and satisfaction."

Experienced Low Bidder Sues City

A reader wrote a letter, in part. as follows: "Is a city obligated to accept the lowest bid submitted for doing advertised work?"

The answer is yes, if the bidder is responsible, experienced, and efficient.

For example, in *Fetter* v. *Wilmington,* 73 Atl. (2d) 644, the testimony showed that a city advertised for bids for installation of certain public works. The city officials reserved the right "to reject any or all bids," but a city ordinance provides that installation contracts

Ag-lime FINES bring more money.

EAGLE CAGE MILLS

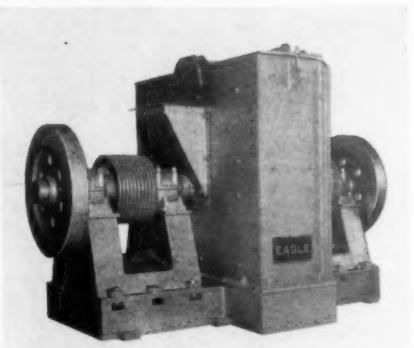
produce more fines.

Coarse grades of ag-lime take longer to reach the plant's feeder root zone and are less desirable. Fine grades of ag-lime bring almost twice the market price and are in great demand.

Yes, you can make more money if you are in a position to produce fine grades of ag-lime. Farming today is a science and the scientists have discovered that the farmer can make more money with the use of finer ag-lime . . . simply because it is absorbed faster.

Fine particle reduction of hundreds of materials is handled with ease by the distinguished line of multi-cage disintegrating mills as engineered and made by Eagle Crusher Company.

Eagle Cage Mills are sold all over the world because they are real money makers, require very low maintenance, have big capacity (10 to 70 tons), have one-piece, electrically welded frame, high quality taper-bore bearings . . . and they have easy access to working parts.



A single pass four-row cage mill by Eagle Crusher Company with its high-speed impact, and disintegrating action using hard-faced bars produces finer aggregate . . . and increases tonnage! This single pass Eagle design produces superior quality ag-lime at an average rate of 30 tons per hour, subject to variations in raw materials and weather conditions.

Write today for free booklet titled:
Make More Money with Eagle Disintegrating Mills.

EAGLE CRUSHER CO., Inc. GALION OHIO-U-S-A

JAW AND ROLL CRUSHERS, PORTABLE PLANTS, CAGE AND HAMMERMILLS, CONVEYORS, LOADERS

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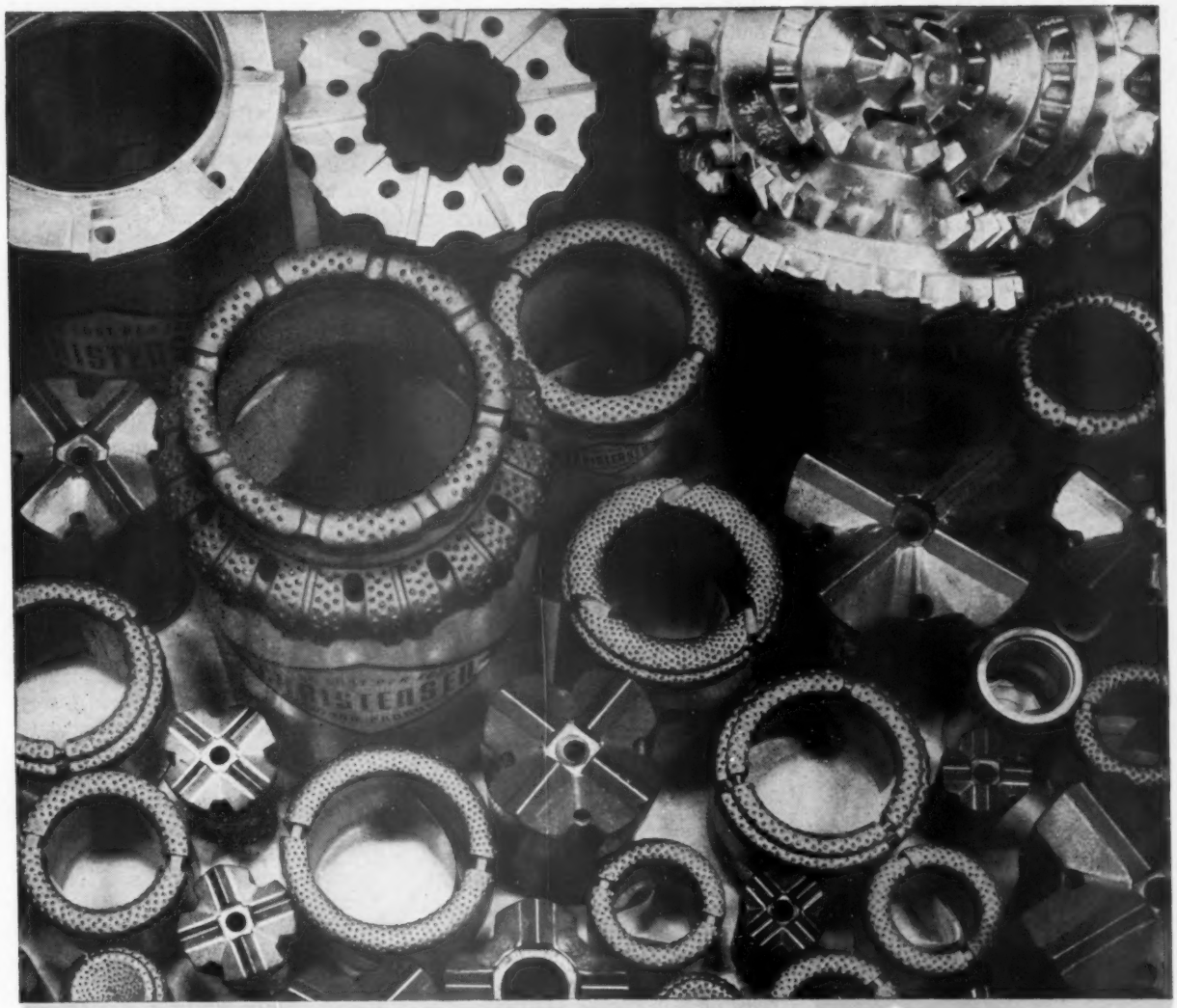

If your problem is making hole . . .

. . . Christensen offers a complete line of diamond bits, reaming shells, and core barrels. Also available are tungsten carbide and roller cone bits. When you need "complete" custom bit service, contact Christensen.

"Less cost per foot"

CHRISTENSEN DIAMOND PRODUCTS

MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST
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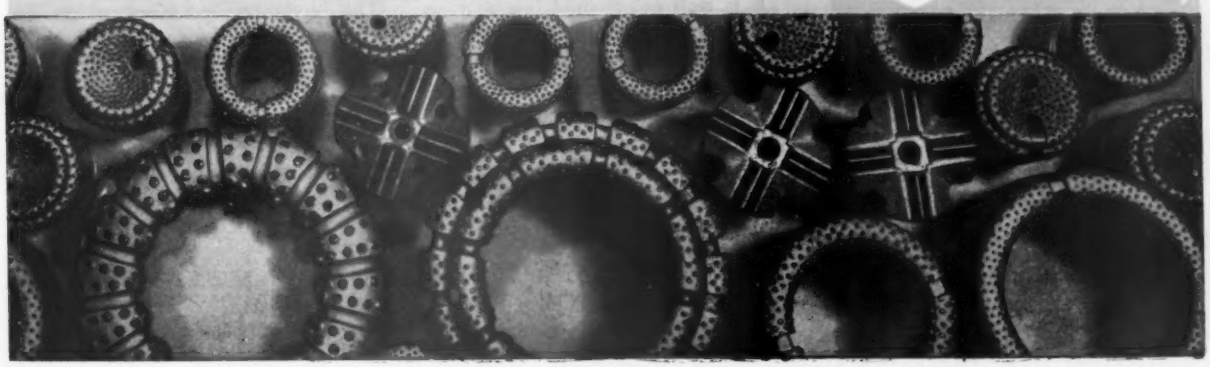
SERVICE FROM WORLD-WIDE SALES OFFICES AND MANUFACTURING PLANTS



Everything for BLASTING ...except the hole!

Propellex EXPLOSIVES

BLASTING CAPS
Electric or fuse-type.

"PRIMACORD"
For trunklines and downlines—permits loading and priming of each charge to insure most dependable use of explosives.

BLASTING AGENTS
"*Propex*" . . . non-cap-sensitive, medium density, Nitro-Carbo-Nitrate (NCN). Optimum fragmentation and toe-out . . . minimum cost. Free-flowing—no on-the-job mixing.
"*Propex Stix*" . . . packaged in polyethylene bags for safe, dependable use in water-filled or horizontal holes. Same outstanding performance characteristics as "Propex."
"*Pro-Gel*" . . . specially formulated for hard-rock blasting. Combines high velocity with high pressure.

PRIMERS
"*Saf-T-Boost*" . . . over 25,000 feet per second detonation velocity! Two models —3-½" diameter holes and larger . . . and under 3½" diameter holes.

Need technical assistance? A highly skilled Propellex explosives engineer will gladly help you solve any blasting problem quickly . . . safely . . . economically. Write, wire or phone!

PROPELLEX
Chemical Division,
Chromalloy Corp.
Box 187 • Edwardsville, Ill.
Phone: 656-3400, Area Code 618

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shall be let to the "lowest and best bidder."

A contractor, named Fetter, sent the city a sealed bid of $383,570.00 for the proposed work. Later Fetter learned that the contract had been awarded to another, higher bidder.

Fetter then sued the city and proved that he had been, for a period of approximately thirty years, continuously engaged in the business of construction and contracting, and that he had bid upon and completed numerous construction projects in the state. Also, Fetter proved that he enjoyed an excellent reputation in the contracting field and never defaulted upon a project awarded to him. In view of this testimony the higher court held:

"A reasonable man of experience in construction of this kind could not but have admitted, after proper investigation, that Fetter was fully competent to discharge the responsibility entailed. With the knowledge on the part of the defendants (city) as to skill and competency of plaintiff (Fetter) to perform the work required, the action of the defendant (city) in awarding the contract to a higher bidder was taken in disregard of the defendant's duties to the taxpayers of Wilmington . . . Plaintiff (Fetter) was fully competent to do the work involved at a lesser cost than would result from awarding it to a higher bidder and defendant (city officials) were fully aware of this fact."

Contractor Furnished Transportation

Another reader asked: "Can an injured employee sue and get an award for compensation when he proves that his injury was sustained while he was using his employer's automobile for going to and from his work?"

It is well established law that an employer who furnishes transportation to an employee is liable for compensation payments or damages if the employee is injured during the transportation. Also, a new higher court decision holds that this rule of law includes employers who furnish motor vehicles to employees.

For example, in *Travelers* v. *McCown*, 206 S. W. (2d) 663, it was shown that a contractor furnished an automobile to an employee and paid the upkeep, and also furnished oil and gasoline.

One morning the employee was badly burned while attempting to start the car with a torch. He sued for compensation. The higher court held that the employee could recover compensation under the State Workmen's Compensation Act.

On the other hand, this higher court indicated that this rule of law is not applicable where an employee sues for damages, instead of compensation under the State Workmen's Compensation Act. In other words, no damages will be awarded unless the testimony proves that the employer negligently caused the injury.

Must Prove Warranty

A few weeks ago a higher court laid down this law: The fact that a seller states that a piece of used equipment has been working satisfactorily is not guarantee that the purchaser will be satisfied. Hence, unless dissatisfied purchaser proves that the seller gave a definite guarantee, the purchaser takes the equipment "as is."

For illustration, in *Carbon* v. *American Equipment Company,* 358 Pac. (2d) 128, the testimony showed facts, as follows: A seller sold a used rock crusher to the Vail Company for $6,500.00. The rock crusher was loaded on a truck and transported to the Vail Company's quarry where it was set up for operation.

After it had crushed a small amount of rock, it ceased to operate. When the crusher was dismantled it was ascertained that the drive shaft was cracked and bent. Replacement repairs and cost of transportation totaled $4,572.47.

The seller sued the buyer to collect the unpaid balance of $5,000.00 on the price of the rock crusher. The buyer refused payment on the grounds that the seller had practiced fraud by warranting that the crusher was in good condition.

Further testimony showed that the crusher was operating satisfactorily right up until the time the seller shut it down, just prior to the sale, and also that the seller made no absolute guarantee except to say that the crusher had been operating satisfactorily.

In view of this testimony the lower

court held the seller not liable on a warranty and ordered the purchaser to pay the full balance due. The higher court approved this verdict, saying:

"The lower court specifically refused to make a finding that there was an express warranty. All that Mr. Pete Carbon (seller) said was that the crusher had 'operated satisfactorily right up until the time they shut it down.'"

Flares Prove Care

A few weeks ago a higher court clearly held that placing flares both to the front and rear of a motor vehicle, stalled on a highway, indicates a degree of care likely to result in the vehicle owner being not liable in damages for a subsequent collision.

For instance, in *Knarian* v. *South Haven Sand Company,* 106 N. W. (2d) 151, it was shown that a driver employed by the South Haven Sand Company parked his disabled double bottom trailer unit on the right side of a highway and placed flares to the front and rear of the trailer unit. A driver of another truck approached the trailer unit from the rear and a wreck occurred.

In subsequent litigation, the higher court refused to hold the South Haven Sand Company liable in damages for injuries sustained by a person riding in the truck.

Employee Can't Sue For Damages

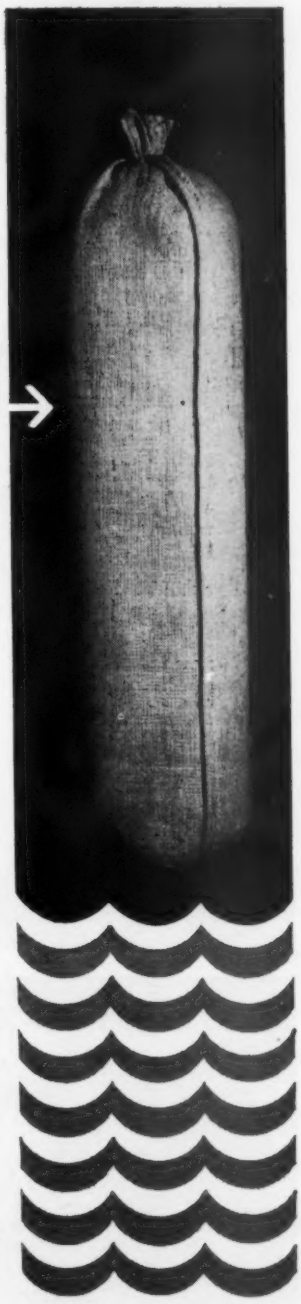
It is well known that if the employer of an injured employee is covered by the State Workmen's Compensation Act, the injured employee cannot sue his employer for damages but must accept compensation specified by the State Workmen's Compensation Act. Generally speaking, the injured employee can sue and recover damages from a third person whose negligence caused the injury. However, a few weeks ago a higher court rendered an outstanding decision which importantly modifies the usual law on this subject.

For illustration, in *Pruett* v. *Lining and Son,* 356 Pac. (2d) 547, the testimony showed facts, as follows: A man named Pruett was employed as a construction worker by an employer engaged in the general contracting business. He was working with concrete near an electrical transmission line, and there was present at the construction site a mobile crane. The crane was used to swing a concrete bucket from a point where concrete-mixer trucks disgorged their contents to the places where Pruett's employer could utilize the concrete during the course of construction. This crane was owned by a partnership (Lining and Son) which was engaged in the pre-mixed concrete business.

Both the partnership, (Lining and Son) and Pruett's employer had coverage for their workmen under the State Workmen's Compensation Act.

The procedure usually followed by Pruett's employer can be briefly described as follows: Lining and Son's ready-mix trucks would deliver their contents to the job by means of a chute fastened to the rear of the truck. At the point

Tailor-made to give you more efficient blasting! **BEMIS EXPLOSIVES BAGS**



Bemis Explosives Bags for ammonium nitrate and nitro-carbo-nitrate are tailor-made to your requirements—to give you more efficient blasting.

More economical: Use of Bemis Explosives Bags and ammonium nitrate mixtures can save up to 50 percent on explosives costs.

Easy to fill: Bemis provides technical assistance, manufactures equipment to speed up bag filling.

Wet hole or dry hole . . . you'll get top efficiency at minimum cost with . . .

Bemis Burlap Bags with heavy-duty polyethylene liners. The rugged burlap absorbs the punishment of handling or jagged holes. Poly liner provides waterproofness.

Other Bemis Explosives Bags:

Flexiply® Bag with poly liner. Here three plies of rugged creped wet-strength kraft provide the toughness.

Laminated Bags. Constructions of burlap, kraft paper, polyethylene and pliofilm—in varied combinations—are all performing satisfactorily in the pits and on construction sites.

Write today for sample bags and additional information on Bemis Explosives Bags.

Bemis

Where packaging ideas are born

General Offices—408-Y Pine Street, St. Louis 2

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EIGHT TESTED—LORAIN

Two Lorain Moto-Loaders, Model ML-309, with 9000 lbs. operating capacity, are shown loading shot rock at the quarry face. One is equipped with a 3-yd. bucket, the other with a 4-yd. bucket.

Mr. Robert A. Silvernail, Superintendent, describes the Best operation as a quarry and a processing plant where the rock is processed, dried, sorted and graded for the market, plus a concrete block plant known as Bestone Inc.

MOTO-LOADERS® CHOSEN

Walter C. Best Inc. at Chardon, Ohio, tested eight different makes of front end loaders, including Lorains, in their quarry. After several thousand hours of carefully documented, on-the-job operation in 1960, they unhesitatingly chose Lorain Moto-Loaders. Two Lorain Moto-Loaders ML-309 have been handling all the production on this operation since January 1961 without a single hour of down time. Much of the 200,000-ton yearly output of silica sand and aggregate is handled 2 or 3 times.

Replaces 8 pieces of other equipment

The two Moto-Loaders replaced a whole fleet of other types of equipment and made it possible for Best to revise completely their production procedures.

Less than half the capital needed

Because less equipment is needed, less capital investment is required. Best claims they reduced their capital needs by more than 50% by turning to the Moto-Loader method.

Man-hours reduced 75%

Labor costs went down drastically after the Moto-Loaders were installed. Man-hours were reduced from 120 to 30 *a day*.

Down time eliminated

Robert A. Silvernail, Best's Superintendent, says, "The rugged dependability of these units saves us hundreds of dollars in down time a year. They simply do not break down, and maintenance is confined to lubrication and oil changes. This can spell the difference between profit and loss on many an operation. *There has been no down time for any other reason.*"

Versatility is invaluable

Mr. Silvernail continues, "We don't believe there is anything these Moto-Loaders can't do. They have loaded trucks with the shot rock, stockpiled materials, stripped overburden, cleaned out a swamp, moved a 2-ft. layer of rock to grade for a road, dug excavations, moved trees and heavy machinery, cleared snow, pushed and towed trucks and railroad cars, charged bins and substituted for winches. You name it and Moto-Loaders do it for us. They are invaluable. Either machine is ready at any time to do the work of four different ones, at four different places and you know that this kind of versatility makes them pay and is saving you money."

One Moto-Loader double-shifted

During eight months of the test period one Moto-Loader was double shifted for a total of 2300 hours of service and loaded out 100,000 tons of stockpiled material to trucks in that period.

Moto-Loaders balance important—Drivers find them less tiring

The balance of power, weight and control contributes heavily to the performance of these Lorains. "The ML-309's are splendidly balanced, even at full load, which makes them easy to operate. The drivers find them less tiring, and this contributes to the men's efficiency and safety on the job," is the way Mr. Silvernail puts it.

Other features, too

To get the kind of dependable, cost-cutting performance experienced by Best requires many advanced design, construction and operating features. You don't out-perform seven other top brands of loaders without real, solid reasons. Here are some of them.

One-foot control. Control of selection of forward and reverse and acceleration is done with just one foot. Both hands free for steering and other controls.

Four-speed, full-power shift gives continuous straight-through, full-power shifting from 1 to 4 without stopping for selection. This Lorain Moto-Matic Transmission, plus torque converter speeds up cycles.

"Safety" arms, S-shaped for greater reach, provide full side visibility at all times. The bottom edges stay below cockpit sides at all times for complete safety.

Better tractive effort is obtained through 4-wheel drive using planetary axles with high traction differentials. Torque is kept at the ground where it belongs.

Want to know more? Why not see your nearby Moto-Loader dealer for all the reasons? Or arrange a demonstration so you can see for yourself what a Lorain Moto-Loader can do. You'll be glad you did.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

LORAIN®

DOES MORE FASTER • FOR LESS

PLANTS in Lorain and Elyria, Ohio.
PRODUCTS—Power shovels, cranes, draglines, clamshells, and hoes on crawlers from ⅜- to 2½-yard capacity • Cranes from 7 to 80 tons . . . on crawlers, and as rubber tire Moto-Cranes, and Self-Propelled Cranes • Rubber tire front-end Moto-Loaders in 6,000-lb., 7,000-lb., and 9,000-lb. operating capacities.
OUTLETS—Lorain products sold and serviced by 249 distributor outlets throughout the world.

where the wet concrete left the chute, it became the duty of the purchaser (Pruett's employer) to place the concrete in the forms. If the forms were close enough to the truck, the operation was comparatively simple. The truck operator merely regulated the flow of the concrete down the chute to accommodate the workmen who spread the concrete and worked it into the forms.

If the truck could not approach the forms closely enough for direct placement into the forms, Pruett and his fellow workmen ordinarily wheeled the wet concrete away from the truck in wheeled bucket carts, or "buggies."

On the day of the accident, it was decided by Pruett's employer to utilize a crane with a bucket suspended from a boom to receive the contents of the ready-mix trucks. The crane would then swing the wet concrete to the point where it was desired that it be placed in the forms.

The use of the crane eliminated the necessity for workmen to wheel the buggies, and also speeded the work. Since Pruett's employer did not own a crane, he hired, at an hourly rate, the use of the Lining and Son's crane.

While the work was in progress, Pruett either pushed the crane bucket, or had a hand on it, when the boom from which the bucket was suspended swung against the electrical transmission line, and a charge of 7,200 volts of electricity was caused to pass through Pruett's body.

Pruett sued Lining and Son for damages. However, since both Pruett's employer and Lining and Son were covered by the State Workmen's Compensation Act, the higher court held that Pruett must accept compensation specified by the State Workmen's Compensation Act and that he could not sue Lining and Son for damages. This court said:

"It is the legislative policy to encourage employers to accept the coverage of the Compensation Act by making that act the exclusive remedy for industrial accidents suffered by workmen of the covered employer, as well as by the workmen of other covered employers engaged in the furtherance of a common operation, where the workmen of both employers are jointly involved in the work out of which the accident arises."

Jury Believes Witnesses

A quarry operator asked: "Is it possible for a property owner a mile from blasting operations to prove that the blasting damaged his building, and get a damage judgment against the quarry company? If so, on what proof?"

The answer is in the affirmative, if expert witnesses gather detailed data, and testify in favor of the property owner.

For example, in *School District* v. *Petersen Quarry Company*, 99 N. W. (2d) 602, it was shown that a school building was built about 1920. It was of brick construction on a concrete foundation. There was no steel reinforcement.

A quarry operated by the Petersen Quarry Company was located about one-half mile from the school building. The testimony showed that during the months of blasting at the quarry large cracks appeared in the walls of the schoolhouse where the brick separated, and cracks appeared in the plaster on walls and ceiling, and in the concrete tunnel in the basement. Bricks pulled away from joists at the top of the walls.

The School District sued the quarry company for damages to the school building. Expert witnesses gathered data to which they testified, as follows: Beginning about December 23, 1955, and various times until April 27, 1956, the quarry company used dynamite to blast rock in the quarry.

The blasting was so done as to break the rock into pieces sufficiently small to go through a crusher so that the rock could be used in highway construction. The quarry company often prepared as many as 48 holes for one explosion. These were drilled to depths of as much as 20 feet. Dynamite was placed in these holes to within 30 to 36 inches of the top. Dirt was then tamped in the holes to lessen any upward push of the explosion. The dynamite was so wired that it exploded in "delays" of 25/1000ths of a second, and there were from two to four delays in each explosion.

Beginning December 23, 1955, and ending April 27, 1956, the quarry company exploded dynamite two days in December, nine days in January, ten days in February, 21 days in March, and 11 days in April. On several days there were two and sometimes three and four explosions a day.

The School Board offered the evidence of other witnesses living within a radius of 2½ miles of the schoolhouse. These witnesses described the effects of explosion blasts at the quarry as follows: the "house commenced to quiver and the windows rattled"; "dishes rattled in the cupboard"; and cans on the shelves of a store "shook" and the floor "shook."

Other expert witnesses fixed the fair and reasonable cost for the repairs, including architect's fee, at $53,900.00.

Although lawyers for the quarry company argued that the alleged damages to the School Building could not have been caused by blasting operations one-half mile distant, the jury believed testimony of witnesses produced by the School District and awarded the School District damages. The higher court approved the jury's verdict.

Engineer Proves Lessor's Case

During the past several years, I received many inquiries from readers as to how a lessor of land can prove that the lessee took more materials from land than was paid for. Finally, a few weeks ago a higher court rendered an outstanding decision which answers this legal question.

For example, in *Giudicy* v. *Marble, Terrazzo & Tile Company*, 329 S. W. (2d) 664, the testimony showed facts, as follows: A land owner, named Giudicy, leased certain of his lands to the Marble, Terrazzo & Tile Company, and granted the latter the right to quarry and remove rock from the land for a period commencing March 1, 1941, and ending March 1, 1985. The seller agreed to pay as rental therefor, $10.00 per year, payable on March 1st, in advance, "together with royalties of five (5) cents per ton for each ton of rock removed from said premises, said royalties to be paid quarterly, on or before the 15th day of January, April, July

Enter 149 on card, page 155 ➔

THEY PUT THEIR SYMONS® CONE CRUSHERS ON WHEELS FOR A 700 TON PER HOUR PORTABLE PLANT

SYMONS® CONE CRUSHERS
. . . the machines that revolutionized crushing practice . . . are built in a wide range of sizes, for capacities to over 1500 tons per hour. Write for descriptive literature.

. . . and A. Teichert & Son, Inc. can move, set up and resume production in minimum time

When A. Teichert & Son, of Sacramento, decides to custom-build a portable plant, they refuse to sacrifice capacity for mobility. That's why they selected two Symons Cone Crushers as the heart of this unitized plant. They can produce up to 700 tons of 1½" base material per hour. Even crushing 50%, they usually exceed 500 tons per hour. And with all units trailer-mounted, they can move quickly from one job to another and start producing immediately. Set-up consists of adjusting the jacks, erecting the conveyors and connecting the power.

This Teichert plant is supplying aggregate for road-building projects in northern California, a job requiring frequent moves. The highly mobile plant includes two Symons Cone Crushers . . . a 4¼ ft. Standard Cone as secondary, and a Symons 4 ft. Short Head Cone for closed circuit tertiary reduction to ¾" x ⅜" hot mix aggregate and ⅜" x 0" sand.

Mounting Symons Cones on wheels is a typical example of how experienced aggregate producers take advantage of high stationary plant capacities for greater portable plant profits.

Write for descriptive literature.

NORDBERG MANUFACTURING COMPANY · Milwaukee 1, Wisconsin

NORDBERG

SYMONS . . . a registered Nordberg trademark known throughout the world.

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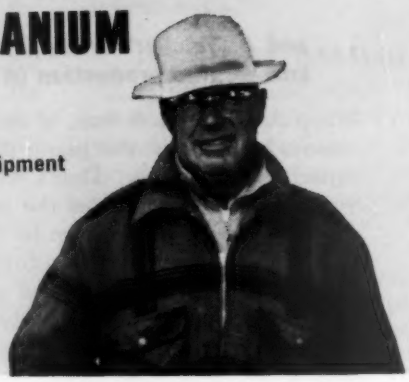
Q361

ATLANTA · CLEVELAND · DALLAS · DULUTH · HOUSTON · KANSAS CITY · MINNEAPOLIS · NEW ORLEANS · NEW YORK · PHOENIX
ST. LOUIS · SAN FRANCISCO · TAMPA · WASHINGTON · WICHITA, KANS. · TORONTO · VANCOUVER · JOHANNESBURG · LONDON · MEXICO, D. F.

FROM CONSTRUCTION WORK TO URANIUM MINING

"Bonded Buy used Cat equipment has always given me first-rate service," says GARN MOODY



Garn Moody has capitalized on his working knowledge of heavy equipment to branch out into a number of successful business operations. From his initial start in contracting, he has put his reliable spread of used Cat-built equipment to work in the non-allied fields of farming and, since late 1958, a thriving strip-mining operation in the rugged country near Delta, Utah.

"When you're moving into an unfamiliar new field, you've got to have smart crews and dependable equipment," says Garn Moody. "My used Cat-built rigs have always given me good steady production. We've worked our two D8s and two DW20s 8 to 10 hours a day since we bought them two years ago. The work is rough, but down time has been light."

Garn has purchased all three types of used equipment his Caterpillar Dealer offers: Bonded Buy, Certified Buy and Buy and Try. "In each case," he says, "the deal worked out fine for me. I'll buy under the same contracts any time. Dependability from Bonded Buy machines is like buying a new machine."

Success is never a sure thing, but if you're expanding your operations and trying to keep your equipment outlay on a budget basis—without sacrificing reliability—check your Caterpillar Dealer's protected purchase plans.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

BEST BUYS IN NEW AND USED EQUIPMENT

Enter 150 on card, page 155

and October of each year."

Most importantly the lease contained no provision for Giudicy to check the amount of rock the Marble, Terrazzo & Tile Company removed from the premises. The latter mailed to Giudicy quarterly statements purporting to show the totals in pounds and tons of the rock removed, together with royalty payments.

A disagreement arose as to the amount of materials the Marble, Terrazzo & Tile Company removed from the land. The lawyer for the latter argued that the only method by which the amount of rock removed from the premises can be proved with reasonable certainty is is by Giudicy proving the actual weight of the rock that left the premises.

Obviously Giudicy himself could not give this proof. He hired one Volz, a registered engineer and surveyor of the State. Volz was at the Marble, Terrazzo & Tile Company's quarry two weeks to make his calculations. He surveyed and made a plat of the quarry to calculate the volume of stone removed. To obtain the shape of the top of the surface he considered the slope of the ground above and below the quarry and he surveyed the perimeter of the quarry. He took cross-section measurements at each distinct change in the shape of the quarry. Then he took the mean distance through the cross-section and the average area of two cross-sections, took two cross-sections at each end of a distance and the mean.

He added all these volumes together. There were about fifty of them all told, and in that way he obtained the cubic feet. He calculated the volume of the fill and overburden left on the premises by the same method. He used 165 pounds per cubic foot as the weight of rock for his calculations. Volz calculated that 5,411,100 gross cubic feet, or 447,000 tons of rock had been quarried on the leased premises, and subtracting 36,400 tons of fill and overburden, showed 410,600 tons of rock removed from the leased premises. Subtracting also the 76,737.45 tons of rock removed prior to March 1, 1941, gives 333,862.55 tons of rock re-

Enter 151 on card, page 155 →

Special report to users of Caterpillar equipment

CAT CATERPILLAR

Parts you can trust
...cost less per hour

New Cat parts stretch dollars "down where the digging's going on"

That's more than just talk! More and more users are conducting their own field trials of ground engaging tools—tips, bits, teeth and edges—to determine which brand gives them the best performance-cost balance. And time after time, they find that genuine Caterpillar ground engaging tools outclass all comers—in production and over-all economy!

Take Cat cutting edges. These edges have been contractor-tested with most of the market's leading brands all over the country. Results: Cat edge wear life—10-60% longer. Cat edge cost—15-50% less per hour. Think of that in terms of dollars!

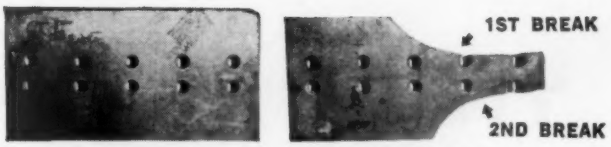
HERE'S A LOOK AT RECENT FIELD TRIALS ON SCRAPER CUTTING EDGES:

Two DW21-470 Scrapers, one with Cat *standard* edges and one with popular brand *thick* edges, were put to work "side-by-side" by a contractor in hard, red clay on an Interstate Highway job. His findings:

Brand	Price	Hours of Life	Cost per Hour
Other	$121.22	1060	$.114
Cat	$128.28*	1360	$.094

HIS SAVINGS WITH CAT EDGES—17.5% PER OPERATING HOUR

*Test completed before recent new low price of $102.30 effective.



CATERPILLAR OTHER BRAND

A Cat 7/8" stinger and another brand *one inch thick* were split in half and a section from each installed on *same* DW21-470 Scraper working in decomposed lava with embedded basaltic boulders. Other brand section broke after 48 operating hours, was reversed but broke again two hours later—a total of 50 hours of life. *Cat edge wear during period was* 1/4", *other brand* 1/2".

Your Caterpillar Dealer has the facts on many of these tests—go over them with him and start to save more now.

Caterpillar continually up-dates its line of ground engaging tools. Some of the newcomers to the line that "stretch your dollars" are: new self-sharpening end bits and ripper tips, patented reversible router bits, and new-design scarifier teeth for Motor Graders. These new money-savers keep production high, costs down.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

moved from the leased premises during the terms of the lease up to October 1, 1956, and unpaid for. This, at the five cents a ton royalty, amounts to $16,693.12 of rock that had been removed from the land.

It is interesting to observe that the higher court held that the Marble, Terrazzo & Tile Company had removed $16,693.12 worth of materials more than it had paid for from the land. Hence this higher court held that the Marble, Terrazzo & Tile Company must pay to Giudicy this sum of money, saying:

"We find no testimony of record that the method used by plaintiff's (Giudicy's) witness Volz in arriving at his determinations was not proper.

"The question is more of an engineering than a legal problem. We have hereinbefore ruled that plaintiff's (Giudicy's) established substantial actual damages and this disposes of defendant's (Marble, Terrazzo & Tile Company's) argument on this issue."

Law of Partnerships

Last week I received a letter from an official of a concrete products company as follows: "When is a partner personally and individually liable for the debts of the partnership? Are members of the partnership liable for debts?"

Modern higher courts consistently hold that if all members of a partnership are financially responsible, the debts of the partnership are distributed equally among them. On the other hand, if only one partner is financially responsible and other members of the partnership are not financially able to pay their legal obligations of the partnership, the sole partner who is financially able to pay the debts is liable for payment of all debts of the partnership.

Another important point of the law involving partnerships is: Any member of a partnership may make contracts for the partnership and all the members are liable. This is so although none of the other partners are aware that these obligations, or a contract for the partnership is being made by the one partner.

For illustration, in *Conner* v. *Vander,* 234 N. W. 101, the testimony showed facts, as follows: A member of a partnership purchased from a cement company certain cement and concrete materials which were used in furtherance of the partnership's business. At the time the purchase contract was made the officials of the cement company were not aware that the purchaser was a member of a partnership.

In subsequent litigation, the higher court held:

"If the material was ordered by one partner for the business of the partnership, and so used, the cement company (seller) had a right to look to the partnership for pay, even though unaware of the partnership relation at the time of furnishing the material."

Therefore, the law is established that a seller of material and merchandise to a partnership can sue and recover full payment from either the partnership or, if the partnership is insolvent, he may sue and recover full payment from any solvent partner of the partnership.

TRIAL SAMPLES

Of World-Famous WHITMORE'S Lubricants NOW IN AEROSOL SPRAY-ON CANS!

HANDI-LUBE LIQUID GEAR COMPOSITION

For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal —no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300% —special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

• Open Gears, Dipper Sticks, Cams • Enclosed Gear Cases • Wire Rope and Cable
• Hydraulic Units, Torque Converters • Roller, Ball, and Sleeve Bearings • Speed Reducers

Est. 1893

THE WHITMORE MANUFACTURING CO.

LUBRICATING ENGINEERS

CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

Enter 152 on card, page 155

National Driver Register To Be Inaugurated

Secretary of Commerce Luther H. Hodges inaugurated the operation of the National Driver Register Service on June 30, 1961, in the Bureau of Public Roads. Operation officially began on July 1.

The driver register, set up and maintained by the Bureau of Public Roads of the U. S. Department of Commerce, is a file on motor-vehicle operators whose driving privileges have been withdrawn for driving while intoxicated or for conviction of a violation involving a traffic fatality.

The program is a purely voluntary, cooperative state-federal enterprise. Names and identifying data on drivers whose driving privileges have been withdrawn for the specified causes will be furnished to the Bureau of Public Roads by the 45 states and territories now participating. The states will be able to request a check on new license applicants. Information on nearly 11,000 drivers has been received.

Enter 153 on card, page 155 →

UNIVERSAL IMPACT MASTER'S EXTRA PRODUCTION CAPACITY KEEPS TWO SECONDARY CRUSHERS WORKING HARD

Why Extra Production Capacity? Because Universal Impact Master's *straight-line flow* eliminates bottle necks, rebounding and congestion.

Rock, falling into the breaking chamber is shattered by the hammers and hurled forward through the upper screen grate. Oversize, falling into the second rotor hammers, is reduced to size and discharged. The rock always moves in a straight-line flow because the hammers turn in the same direction. All finished material is immediately removed from the breaking chamber.

Less power is required to get this high production. You get more tons per hour at a lower cost. And the highly cubicle finished product meets today's rigid specs. Gradation is controlled by simple adjustments.

Enjoy the *extra* dollar and cents benefits of Impact Master's Straight-line Flow. Just contact your Universal distributor for complete information.

PETTIBONE UNIVERSAL
In Cedar Rapids Since 1906

UNIVERSAL ENGINEERING CORPORATION

619 C Avenue N.W., Cedar Rapids, Iowa

A subsidiary of Pettibone-Mulliken Corporation, 4700 W. Division St., Chicago 51, Illinois

"PERFORMANCE EXCEEDED FONDEST HOPES"

Santa Barbara municipal dredge La Reina, "The Queen".

PERFORMANCE of this THOMAS PUMP PROVES THAT...

City of Santa Barbara

California

February 2, 1961

Thomas Foundries, Inc.
Birmingham 1, Alabama.

Gentlemen:

I can't say enough good things about our Thomas Pump. Its performance and wearing qualities has exceeded our fondest hopes. Our pump is the NOL Series with a 14" suction and a 12" discharge. It is working against a line pressure of 120 lbs.

The sand being pumped is a small granular, very sharp beach sand.

The wearing parts give exceptionally good service. For example, we pumped 700,000 yards of sand before having to replace a Shell Liner and 400,000 yards before replacing an Impeller. The seal rubbers on the suction side have to be replace more often, of course, due to the very high head involved.

The service on parts have been very prompt. The courtesy and efficiency of Thomas Engineers in solving the few problems that we had has been of the highest order.

Yours truly,

H. H. Wing
Ass't Street Superintendent

"YOU CANNOT BUY AT ANY PRICE A MORE DURABLE PUMP THAN A THOMAS FOR SAND AND GRAVEL— YOU CANNOT BUY ONE WHICH WILL MAKE YOU AS MUCH MONEY"

How would your dredge pump perform, operating in sharp granular sand against a high dynamic head approaching 300' and with a line pressure of 120 lbs psi? Well, is your pump a Thomas? See Mr. Wing's letter at left.

Its the same story of successful use and operation of Thomas DURABLE Dredge Pumps that has been told for years.

Thomas DURABLE Dredge Pumps are manufactured in range of sizes from 6" to 16" discharge. Additional information on request.

The famous annual Old Spanish Days Fiesta will be held at Santa Barbara this year on August 9-13. See if possible.

THOMAS FOUNDRIES Inc.

P.O. BOX 1111, BIRMINGHAM, ALABAMA

more information, please

Use postcard to receive literature or details on new equipment and products reported in this issue.

PREVENTION OF THE FREE FALL OF THE BOOM when cables fail is the main feature of the crane boom stabilizer manufactured by Yaun Manufacturing Company and described in literature available from Yaun. (301)

INDUSTRIAL TELEVISION MONITORS, including 14-, 17-, and 21-in. screen sizes, are described in 4-page Bulletin ECL 92, from *General Electric*. Capabilities are reported to include a sharp and steady image, application versatility, continuous duty ability, wide brightness range, and easy servicing. Control, accessory, size and weight information and input, electrical and environmental specifications are also supplied. Single copies are free to readers. (302)

GYPSUM, PHOSPHATE, ROCK, SHALE, SLATE, and other slabby or laminated materials can be handled by the "Super Black Diamond" crusher, manufactured by *McLanahan Corporation*. An illustrated folder describes such features as automatic toggles to protect from uncrushable materials without losing production time and quick adjustment of the crushing plate, either closer or farther from the crusher roll. (303)

DRAGSCRAPER AND SLACKLINE CABLEWAY machines, and crescent buckets used with draglines, are described in a folder released by *Sauerman Bros.* Information on wire rope fittings and Durolite blocks is also offered. (304)

POWER TRANSMISSION PLANS AND IDEAS are presented in a 106-page catalog of the roller chain and sprocket line manufactured by *Acme Chain Corp.* The engineering section contains 35 methods of chain adjustments on

FIRST CLASS
PERMIT NO. 44
CHICAGO, ILL.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

—POSTAGE WILL BE PAID BY—

Pit and Quarry Publications
431 South Dearborn Street
CHICAGO 5, ILL., U.S.A.

AUGUST ***PIT AND QUARRY*** ***1961***

Insert key numbers found below items on advertising, literature, and new equipment pages. Print company name if not keyed.

Void after 60 days.

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

We produce _____

AUGUST ***PIT AND QUARRY*** ***1961***

Insert key numbers found below items on advertising, literature, and new equipment pages. Print company name if not keyed.

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Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

We produce _____

more information, please

Use postcard to receive literature or details on new equipment and products reported in this issue.

NEW SUBSCRIPTION ORDER FORM

Send PIT AND QUARRY to me for

____One Year $3* ____Two Years $5 ____Three Years $6

____Payment enclosed ____Bill me ____Bill company

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

Type of business and products _____

*U. S., U. S. Possessions, and Canada only.
Pan American countries, $10 a year; elsewhere, $15 a year.

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movable-sprocket center drives and fixed-sprocket center drives. The catalog is free to engineers and users of roller chains. **(305)**

BUCKETS manufactured by *The Owen Bucket Company* are described in two illustrated folders. Design features and capacities in terms of water level, heaped load, line of plate, and deck covering area are given for the "Type SCL" wide and the "Type KCL" standard width materials handling buckets. **(306)**

BLASTHOLE DRILLING RIGS from 2½- to 7⅞-in. hole size rating are described in bulletins from *Le Roi Division, Westinghouse Air Brake Company*. The drilling rigs operate through a mechanical drive and can be truck, crawler, or wheel mounted. Model LRD-3, a top-drive machine, is designed to drill 100 ft. in depth. Model LRD-2, a lighter rig, drills 30 ft. in a single pass, with direct drive through the rotary table. **(307)**

A REACTOR-CLARIFIER water treatment unit that combines flocculation and clarification in a single tank is described in an illustrated brochure available from *The Eimco Corporation*, Process Engineers Division. **(308)**

VALVES FOR RECIPROCATING COMPRESSORS—evolution, function, and manufacture—are described in a booklet available from *Ingersoll-Rand Company*. Demands made on valves—they open and close up to 60,000 times per hr.—and their function in a compressor are detailed. **(309)**

Material listed here is FREE unless otherwise noted.

BAY CITY

digging ability pays off in rock like this!

Any shovel can load out gravel! But what kind of output would you get in rock like this? It's tough digging — no doubt about it — and certainly no place for an ordinary excavator. Yet, it's a made-to-order situation for BAY CITY digging ability. Here's why:

BAY CITY'S one-piece continuous chain crowd, from front drum through automatic chain adjuster to shipper shaft, provides a powerful crowd-out action. Independent of all other functions, the crowd action gives the operator positive, accurate control of the dipper at every point in the digging cycle. Retract is power-operated, at twice the crowd-out speed, and provides positive handle-control throughout the cycle.

Simple, trouble-free, instantaneous controls mean faster operation, peak production. Mechanical power-controlled boosters actuate drum clutches with minimum effort. The sure, smooth engagement of the large diameter swingers rotates machine and load with a smooth, gliding motion . . . assures careful dumping of load, reduced spillage.

The digging ability of a BAY CITY can be yours. Why not take advantage of it? Stop in to see your BAY CITY dealer soon and explain your pit needs to him. He handles ¾- to 1½-yd. excavators, and will gladly give you the complete story on the size you need.

BAY CITY SHOVELS, INC.
2611-E Center Ave.
BAY CITY, MICHIGAN

(A subsidiary of UNIT CRANE & SHOVEL CORP.)

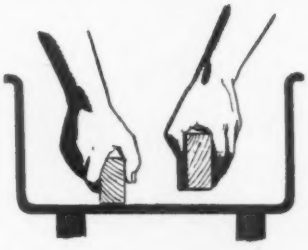
DISTRIBUTOR DAN, the SKF bearing man, says

"TO SHRINK A BEARING ONTO A SHAFT GIVE IT A BATH IN HOT OIL"

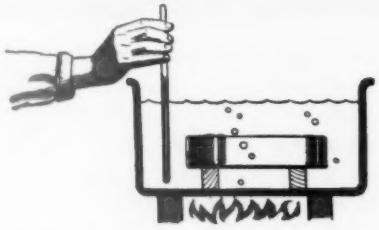
WHY HEAT IT, ANYWAY? If you need an interference fit, it's often convenient to shrink the inner race onto the shaft. To do this, you need to establish a difference in temperature. And it's usually easier to heat and expand the bearing than to cool the shaft.

SOME DO'S AND DON'TS. To heat the bearing, immerse it in hot oil. **Don't** heat the bearing over a flame. And **don't** heat it above 225°F. Plan to use enough oil—either quenching oil that has a minimum flash point of 300°F. or transformer oil.

CLEAN THE CONTAINER FIRST. If you reuse oil, make sure it's absolutely clean by filtering it carefully. Again, use plenty of oil—because too little may heat and cool too rapidly, causing the bearing to heat unevenly.

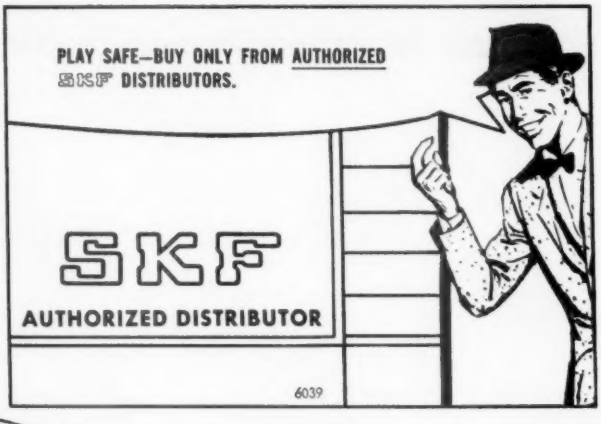


ANOTHER "HOT" TIP. Place a rack at the bottom of the container and set the bearing on it. This will prevent the bearing from touching the hot bottom. It will also separate the bearing from any contamination that may have settled on the bottom.



TO HEAT BEARING UNIFORMLY, place it in the bath as soon as heating starts. Or else allow sufficient time for entire bearing to reach temperature. Stir oil and heat at 200°F. for 15 minutes. Check temperature by immersing a thermometer near bearing.

PLAY SAFE—BUY ONLY FROM AUTHORIZED SKF DISTRIBUTORS.



SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

PROTECT PROFIT MARGINS WITH HENDRIX DRAGLINE BUCKETS - ENGINEERED DESIGNED AND BUILT FOR GREATER PRODUCTION AT THE LOWEST COST-PER-YARD

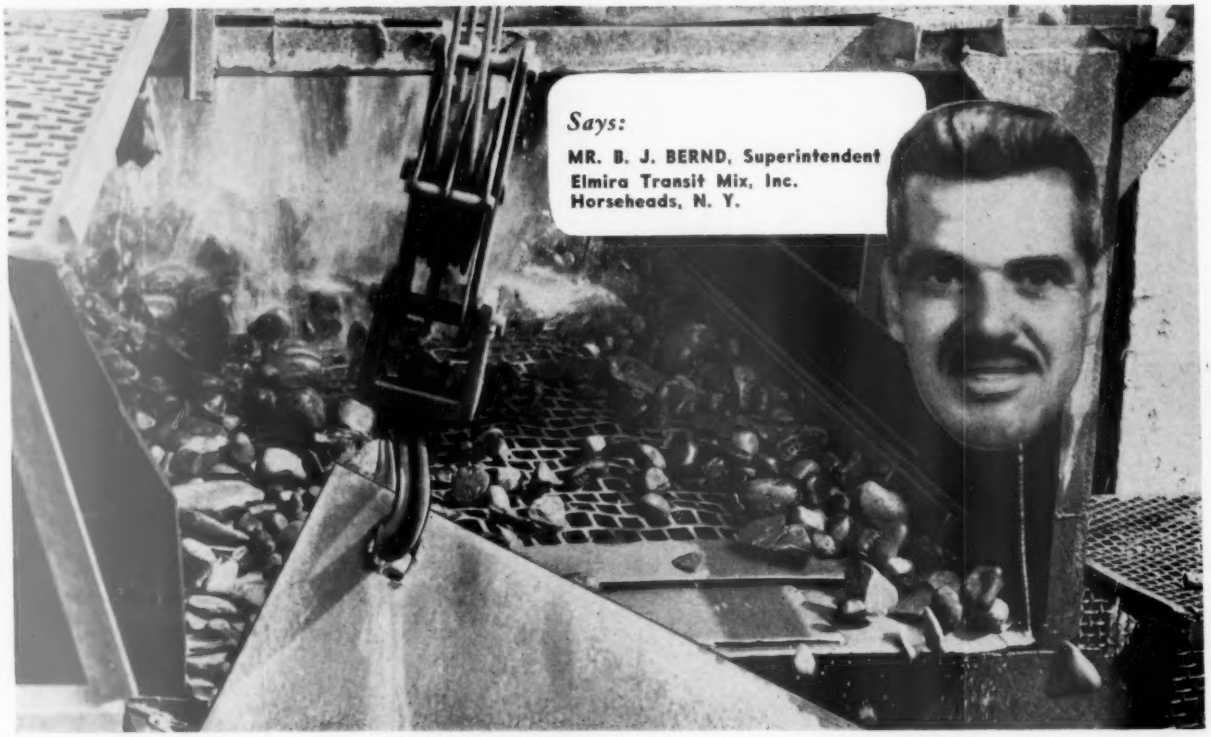
Hendrix Lightweight DRAGLINE BUCKETS

"A Type for Every Digging Purpose"...
¼ to 40 Cubic Yards - Perforated or Solid

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA

"Our SECO SCREEN has given us

8 years without losing a minute!"



Elmira Transit Mix, Inc. boosts T. P. H. 60%

Here's more on-the-job proof of the Big Switch to SECO Screens. Says Mr. Bernd, "Our planned production schedule was increased from 75 T.P.H. to an actual average of 120 T.P.H. . . . and in 8 years our only downtime was charged to simple wire cloth changes. This is operation and profit volume that we like. When we're ready to replace or add . . . believe me, SECO will get the nod." Have SECO VIBRATING SCREENS set the pace for long-term profits in your operation . . . next time you're considering ordering screens check out SECO first!

Send for 4-Bearing Catalog #205
or TWIN BEARING Booklet TB-21

SCREEN EQUIPMENT CO. INC.
Buffalo 25, N. Y.

SECO
PRODUCER PROVEN
VIBRATING SCREENS

Manufacturers' News

A management proposal to change the name of Food Machinery and Chemical Corporation, San Jose, Calif., to FMC Corporation received stockholder approval at the annual meeting held in May. The name change was effective July 1.

FRANK M. CASHIN has been elected president of the Refractories Division, Kaiser Aluminum & Chemical Corporation, Oakland, Calif. Mr. Cashin has been serving as vice-president and general manager of the division.

F. M. Cashin

J. F. Knight

JOSEPH F. KNIGHT has been appointed vice-president in charge of operations for the division. He has served as manager of operations since January, 1955. He will be responsible for the operations of the nine domestic plants of the division.

ROBERT B. MOORE has been appointed manager of process industries sales and engineering for the General Electric Company, Schenectady, N. Y. He will be responsible for the integration of sales and engineering work and will represent the company to markets such as mining, materials handling, and cement.

Expansion of operations at the Burlington, Iowa, plant of the J. I. Case Company, Racine, Wis., involving activation for manufacturing purposes of a 141,000 sq. ft. of space previously reserved for storage, will be effected before the end of the present year.

The operation will involve expansion of the Burlington work force and will concentrate in one location the output of all models of Case industrial crawler tractors. Heavy-duty models have been produced at Churubusco, Ind., in a manufacturing area of the same size as the building now being equipped at the Iowa plant. The present Case utility and industrial tractor models will continue in production at Burlington.

The assets of the Crescent Fastener Co. were recently purchased by the Crescent Belt Fastener Company, New York, N. Y. The management is concentrating its efforts on producing a more satisfactory method of joining belts.

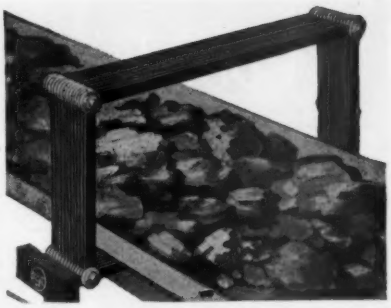
FRANK J. DURZO has been elected executive vice-president of The Jeffrey Manufacturing Co., Columbus, Ohio.

Mr. Durzo joined Jeffrey in March of 1947 as industrial engineer supervisor. He was named vice-president in charge of manufacturing in 1958.

C. J. LEIFELD, whom Mr. Durzo is succeeding, retired on May 31 after 45 years with the company.

HARLEY BROTZMAN has been appointed sales engineer in the compressor division for Fuller Company, Catasauqua, Pa. He will be primarily concerned with the sales and service of Fuller's line of rotary compressors.

Prior to joining Fuller, Mr. Brotzman was assistant sales manager for the Pennsylvania Pump and Compressor Company, Easton, Pa. He was also with Bethlehem Steel Company, Bethlehem, Pa., from 1940 to 1946.



Protect your Crushers

with the RCA Electronic Metal Detector

Steel rods, dipper teeth, tools, and any other type of tramp metal—*magnetic or non-magnetic*—are readily discovered by the RCA Metal Detector before they can damage your equipment. This special industrial equipment is designed to withstand heavy-duty service, dust and moisture. Available in a wide range of sizes. Easily installed over existing conveyor lines.

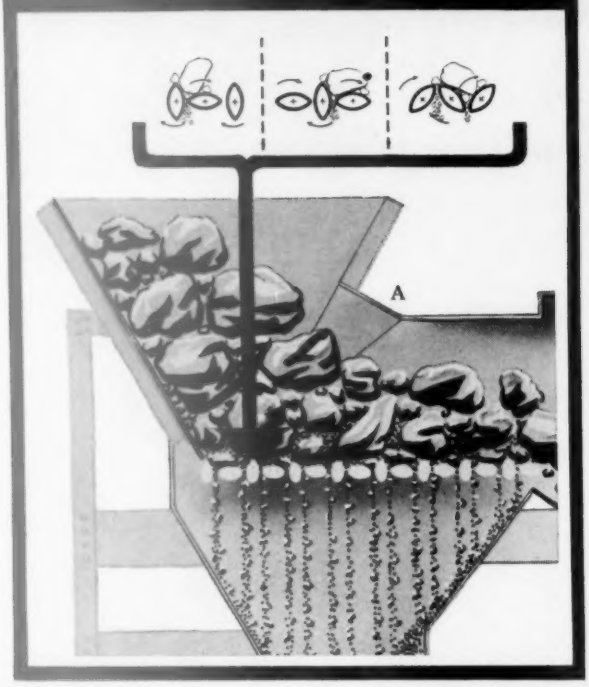
FREE literature telling of the savings possible with the RCA Metal Detector is yours for the asking. Write to RCA, Industrial Controls, Dept. Y-236, Bldg. 15-5, Camden, New Jersey.

The Most Trusted Name in Electronics

RADIO CORPORATION OF AMERICA

Enter 161 on card, page 155

Wobbler Feeder



Doubles primary capacity of limestone operation

A prominent Arkansas white lime company installed a Wobbler Feeder to satisfy their need for a uniform size material with minimum fines for calcination. They also wanted increased output.

They doubled the primary capacity of their limestone operation. And they got a high quality finished product.

Here's how: the Wobbler Feeder (A) takes material directly from the quarry. The tumbling, rocking, forward motion of the load on the Wobbler, quickly and efficiently sifts fine clay and material under 4½" to bottom conveyor, by-passing the jaw crusher completely. Because the Wobbler scalps as it feeds without binding or plugging, it is particularly valuable in wet, sticky material.

The Lime Company's Wobbler Feeder handles from 1200 to 1500 tons per day. Since the Wobbler sends only oversize to the primary crusher, the crusher can handle more material per day, and the Wobbler requires less power than any previous feeding equipment. It is not surprizing that this Arkansas producer is pleased with his purchase.

Learn more about the profitable advantages of the Wobbler Feeder.

FOR THE NAME OF THE HAMMERMILL REPRESENTATIVE NEAREST YOU, WRITE:

HAMMERMILLS, INC.

Subsidiary of PETTIBONE Mulliken Corp

625 "C" Avenue N.W., Cedar Rapids, Iowa

Enter 162-A on card, page 155

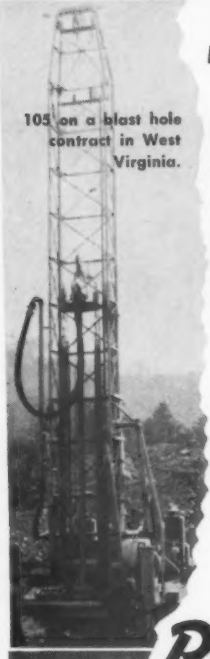
TOTE drills Minnesota metamorphosed limestone at 15' per hour.

Truck mounted 6TA drills blast holes for coal operations.

AIR ROTARY

BLAST HOLE DRILLS *by* PORTADRILL

Designed by rotary experts ... proven on the job!



105 on a blast hole contract in West Virginia.

The following is a partial list of Portadrill owners:

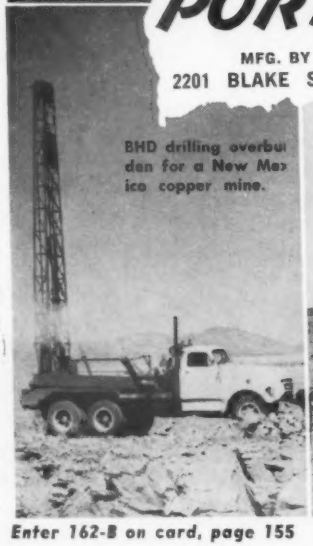
ANACONDA COPPER CO.
DEBARDELEBEN COAL CO.
STRONG CONSTRUCTION CO.
BAGDAD COPPER CO.
MORRISON-KNUDSEN CO.
OLIVER COAL CO.
MERRITT-CHAPMAN & SCOTT CORP.
U. S. BORAX & CHEMICAL CO.
PITTSBURGH AND MIDWAY COAL CO.
H. M. HOLLOWAY, INC.
J. R. SIMPLOT CO.
TRUAX-TRAER COAL CO.
ISBELL CONSTRUCTION CO.
TASA COAL CO.
PETER KEWIT SONS' CO.
KENNECOTT COPPER CO.

Eight models for hole sizes 3½" to 9" — customized to your drilling needs.

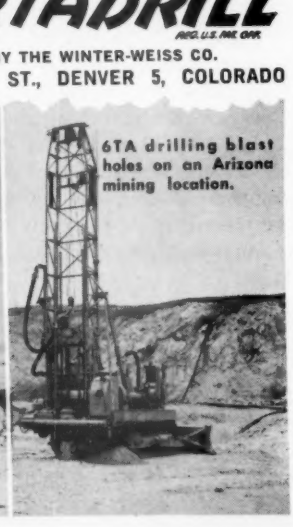
INQUIRIES WELCOMED

PORTADRILL

MFG. BY THE WINTER-WEISS CO.
2201 BLAKE ST., DENVER 5, COLORADO

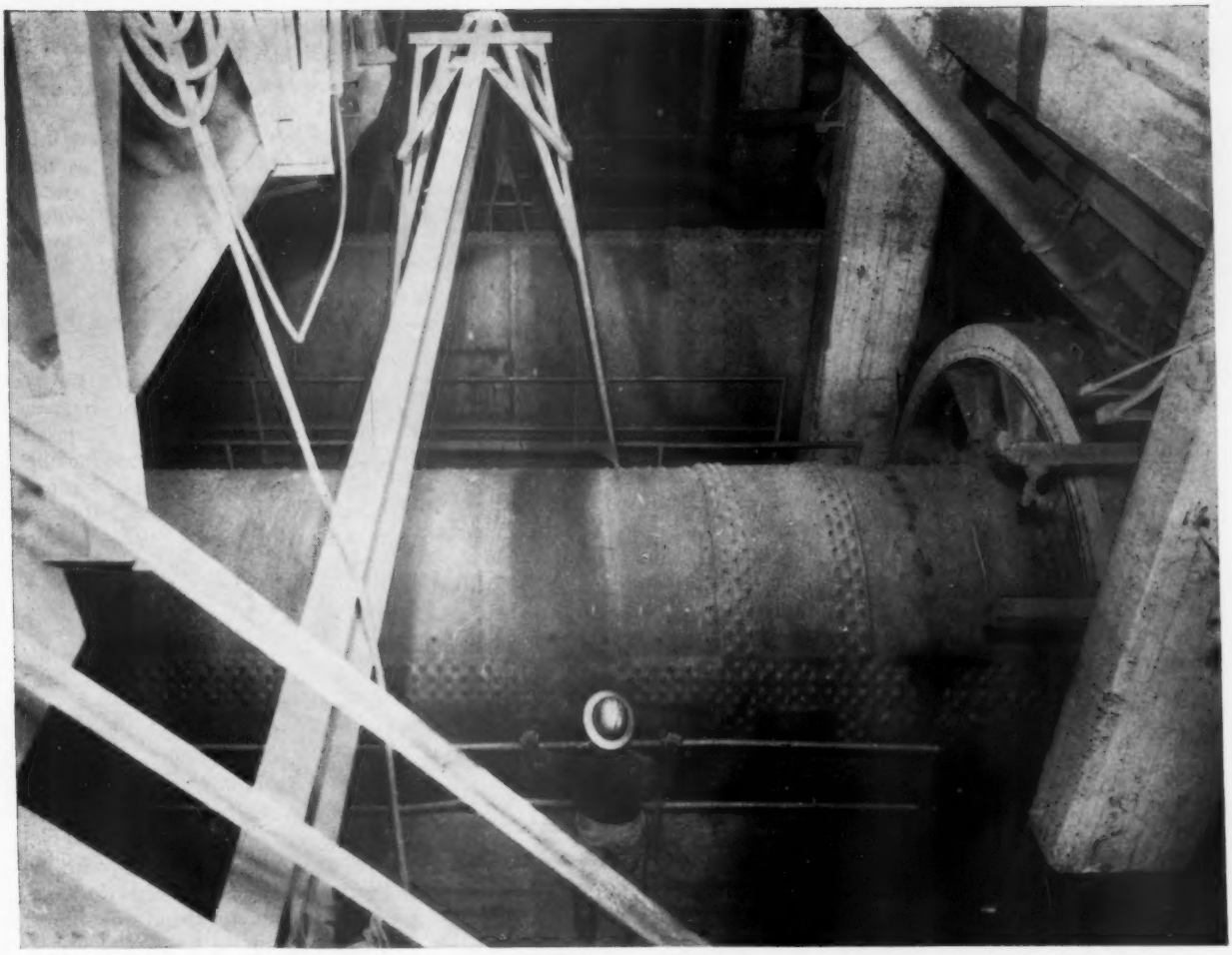


BHD drilling overburden for a New Mexico copper mine.



6TA drilling blast holes on an Arizona mining location.

Enter 162-B on card, page 155



Ni-Hard mill liners save dollars for cement-plant operators

Twelve years ago a large cement company installed Ni-Hard* nickel-chromium white iron liners in their No. 2 dry-grinding mill.†

They are *still* in excellent shape.

What's more, the plant estimates that they're good for at least *another* 10 or 12 years' service. So it's no wonder they've put Ni-Hard liners into two more mills!

High Abrasion Resistance

Try Ni-Hard iron alloy in *your* mills. It is unlike other cast irons. Not only is its structure as hard as that of fully hardened steel, but it contains firmly embedded hard carbides which help to make it *one of the most abrasion-resistant cast products commercially available to you.*

Ni-Hard liners often double or triple the interval between mill relinings. And Ni-Hard liners often hold their original contour right down to the last quarter-inch!

Minimize Needless Shutdowns

Next time you reline a mill, try this nickel-chromium white iron. Ni-Hard liners can be produced in practically any design to meet your individual grinding requirements. And segments can be fastened by any commonly used method. Try a set and see for yourself how they give you maximum abrasion resistance at lowest ultimate cost.

Valuable Booklet Tells More

Every plant operator who ever faces an abrasion problem should have a copy of *"Engineering Properties and Applications of Ni-Hard."* This 60-page, illustrated booklet gives you all the facts about Ni-Hard iron performance and suggests where and how to use it for best results. We'll send a copy on request. But for really fast action, just get on the phone and call your local Ni-Hard producer. (If you don't know his name, ask us.) He'll answer your every question about long-wearing, abrasion-resisting Ni-Hard iron.

*Registered trademark
†Name and details supplied upon request.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N. Y.

NI-HARD

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

EUGENE A. HICKOK has been appointed general manager of the newly formed Contract Division of Geophysical Specialties Company, Wayzata, Minnesota.

The new division will offer the services of the firm's engineers and geologists and/or equipment to contractors and others interested in the location and nature of subsurface rock formations and underground water supplies.

JOHN W. CARLSON has been appointed general manager of the Engine-Material Handling Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis. He has been assistant general manager of the company's Construction Machinery Division since Sept. 1, 1960 and succeeds L. C. DANIELS who, in anticipation of retirement, asked to be relieved of the duties of this post.

Mr. Carlson joined Allis-Chalmers in 1938, following graduation from the University of Idaho with a bachelor of science degree in mechanical engineering.

LEWIS J. BURGER has been named president of LeTourneau-Westinghouse Company, Peoria, Ill., succeeding MERLE R. YONTZ.

L. J. Burger

Formerly associated with General Electric in various management capacities, Mr. Burger has assumed his new duties as president of the Peoria company. He had served consecutively at General Electric as general manager of the gear motor and transmission components department, gas turbine department, Switchgear and Control Division, and laboratory operations of the Component Products Division.

Mr. Yontz resigned the presidency of LeTourneau-Westinghouse, which he has headed since it was formed in 1953, when Westinghouse Air Brake Company, Pittsburgh, bought it from R. G. LeTourneau, Inc. He has accepted a position with Caterpillar Tractor Company.

EDWARD H. MCGRAW, eastern district sales manager for the Chain and Electrode Divisions of The McKay Company, died on April 18 after a brief illness. He joined McKay in 1936 after serving as field representative for General Motors Corporation. During World War 1, Mr. McGraw served as a pilot in the U. S. Army Air Service.

GEN. HARRY A. MARKLE JR. has been appointed director of engineering for Fuller Company, Catasauqua, Pa. This assignment includes the direction of all Fuller divisions, subsidiaries, and affiliates. Prior to this appointment he had been chief engineer.

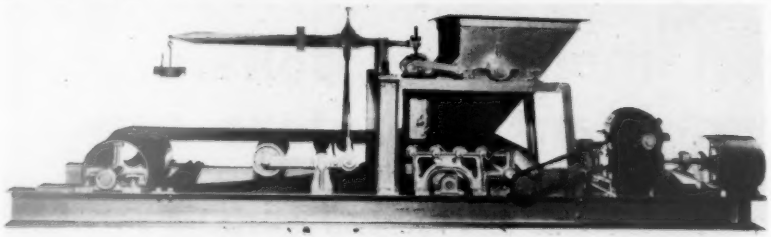
WILLIAM F. LANGE has been named chief engineer of the Products Division of Todd Shipyards Corporation, New York, N.Y. Mr. Lange will report to WILLIAM H. BOHN, general manager of the Products Division, in Brooklyn. This appointment coincides with the Products Division's stepped-up engineering activities and the recent acquisition of the sales and manufacturing rights to the Carrier heat diffuser. This division also manufactures industrial combustion equipment and fuel atomizers. The new direct fired air heater will be marketed through manufacturer's representatives.

ROGER G. DELONG, vice-president, assistant general manager, was elected to the board of directors of the Twin Disc Clutch Company, Racine, Wis.

Mr. DeLong joined the company in 1939.

DR. ROBERT B. BOOTH has been appointed manager of the mining chemicals research and development section, American Cyanamid Company, Bound Brook, N. J. Prior to this appointment he was a group leader in the mining chemicals research section.

FOR PERFORMANCE



Install a Schaffer Poidometer

1600 SCHAFFER SCALES SERVING INDUSTRY

The Schaffer Poidometer is specially designed and built to assure uniformity on a high-economy output.

With a Poidometer you'll have accurate WEIGHT-DATA at your finger tips.

The remote control devices of the Poidometers, WEIGH, FEED, BLEND, MIXES, RECORDS and PROPORTION with the highest degree of accuracy.

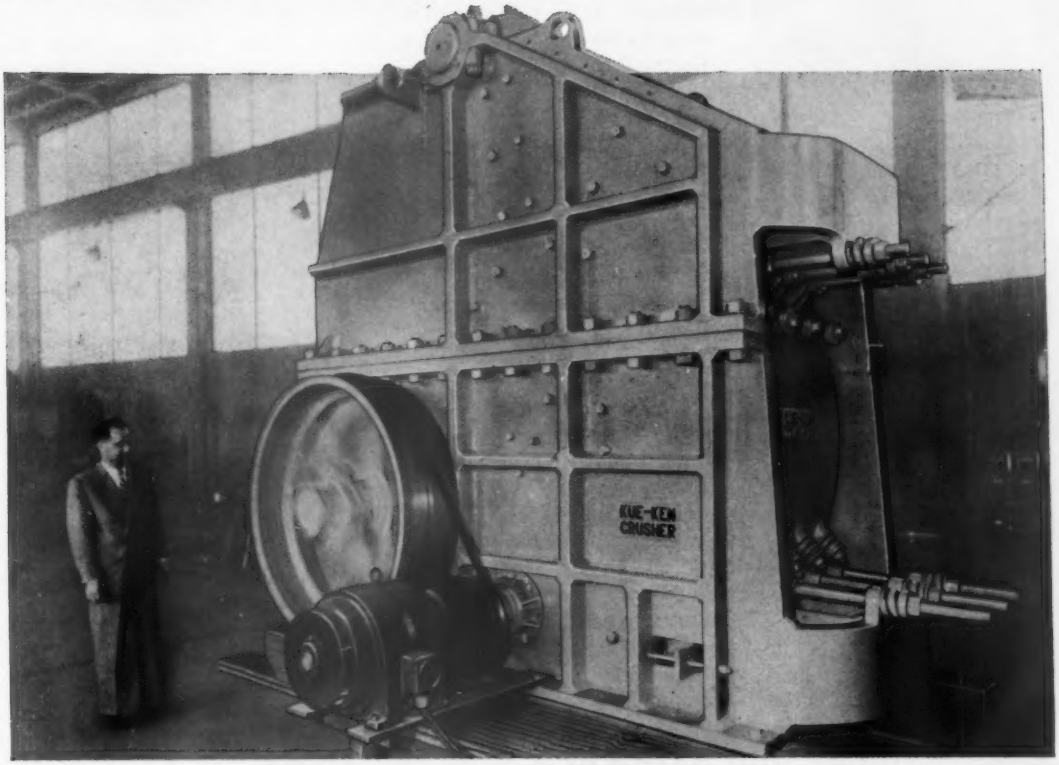
WRITE FOR DETAILS AND CATALOG NO. 5

SCHAFFER POIDOMETER CO.

2828 SMALLMAN STREET PITTSBURGH 22, PA.

Enter 164 on card, page 155

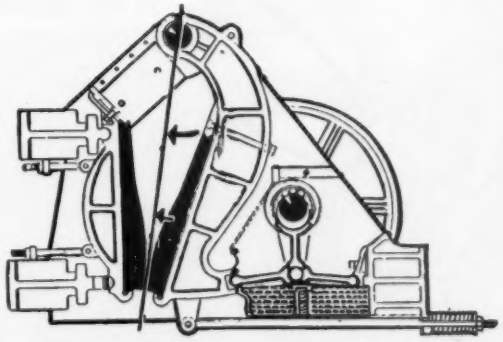
KUE-KEN® crushes at higher speeds with power to spare



Kue-Ken has greater capacity for its size than any other crusher. With a highly efficient lubrication system, Kue-Ken operates at higher speeds and crushes more tons per hour on substantially less power. In shop test, the 48" x 42" Kue-Ken above is started by a 30 hp motor with a single vee belt and runs mounted on skids not fastened to the floor at the operating speed of 275 rpm on only 17 hp. With a pendulum type swing jaw, Kue-Ken eliminates power waste inevitable with conventional crushers that require the lifting of heavy, unbalanced jaws. Operating on the patented "crushing without rubbing" principle, Kue-Ken utilizes power to crush rock and not to wear out jaw plates.

Driven by toggles that multiply leverage 3 to 1, Kue-Ken swing jaw has maximum leverage at top where large rocks are crushed with less power. The precision machined toggle mechanism operates in a sealed, filtered oil bath to reduce wear and friction to the absolute minimum. Power that is wasted in non-sealed, dirt-catching mechanisms is fully utilized by Kue-Ken in crushing rock.

Kue-Ken operates with a single lightweight flywheel that is easily started with a normal duty squirrel cage motor. An automatic, adjustable safety release integral with the flywheel ends shearing or breaking parts caused by tramp iron. In 33 sizes from 12" x 7" to 48" x 48", Kue-Ken Crusher crushes more rock with less power for lowest cost-per-ton crushing.



Kue-Ken "crushing without rubbing" lenthens jaw plate life at least 5 times! The pendulum type jaw supported on a stationary hinge pin in center line of the crushing zone swings in an almost straight line to crush rocks squarely without rubbing.

KUE-KEN® CRUSHERS

"CRUSHING without Rubbing"

STRAUB MFG. CO., INC. 8381 Baldwin St., Oakland 21, Calif.

Jaw Crushers Gyratory Crushers Overhead Eccentic Crushers Revolving Screens Classifiers Feeders Rib Cone Ball Mills Concentrating Tables Vibrating Screens

Pennsylvania Crusher Division, Exclusive Licensed Eastern Manufacturer and Distributor, 323 S. Matlack St., West Chester, Penn.
Armstrong Whitworth (Metal Industries) Ltd., Authorized Licensed Manufacturer and Distributor. Close Works, Gateshead-upon-Tyne 8, England

DEALERS:
SEATTLE, WASH., Washington Machinery Co. • VANCOUVER, B. C., Universal Equipment Co. • SALT LAKE CITY, UTAH, Lund Machinery Co. • SAN ANTONIO, TEX., Closner Equipment Co. • LOS ANGELES, CALIF., Garlinghouse, Froman Co. • SAN FRANCISCO, CALIF., Aggregate Engineers, Inc. • PORTLAND, OREGON, Air-Mac, Inc., of Oregon • BISMARCK, NORTH DAKOTA, Midwest Equipment Co.

DONALD G. ASHE, sales manager of The Allen-Sherman-Hoff Pump Co., Paoli, Pa., was elected vice-president of the company at the May meeting of the board of directors. Sales engineer since 1954, he has been head of sales engineering since 1958.

D. G. Ashe

Mr. Ashe was concentrator metallurgist with The Cananea Consolidated Copper Company, S.A., at Cananea, Sonora, Mexico, for four years prior to joining A-S-H., manufacturer of pumps for moving abrasive and corrosive materials in mines and processing plants.

The similarity between Mr. Ashe's name and the company name is a coincidence.

A number of appointments to managerial posts in sales and marketing have been announced at Research-Cottrell, Inc., Bound Brook, N. J., manufacturer of industrial gas cleaning equipment.

WILLIAM G. HENKE was named manager, sales co-ordination. Most recently he has been a district representative.

FRANK H. FORD was appointed to the newly created post of marketing manager. Prior to joining Research-Cottrell he handled gas turbine marketing for Clark Brothers Co.

Other appointments include: JOHN W. HOMER, district sales manager of the New York office; ROBERT J. VANASSE, sales engineer in the New York office; HOMER A. LAMOTTE and KENNETH L. WILLIAMS, sales engineers in training.

Company officials of the Fiske Brothers Refining Company, Newark, N. J., and Toledo, Ohio, recently paid tribute to JAMES J. WHITE, general manager of its Lubriplate Division, on the occasion of his 35th year of service with the company.

WALTER M. YOUNG has been elected a vice-president of Richardson Scale Company, Clifton, N. J. He will continue to direct the marketing activities of the company.

Mr. Young has been with Richardson since 1948, when he joined the company's engineering department. After holding a number of positions he became director of sales in 1956.

A new operating group, the Electronic Systems and Equipment Group, hase been established at Thompson Ramo Wooldridge Inc.

The new group will include the operating divisions formerly known as the company's Commercial Electronics and Intellectronics Groups.

M. E. MOHR, vice-president and formerly general manager of the Intellectronics Group has been appointed general manager of the Electronic Systems and Equipment Group. W. M. JONES vice-president and formerly general manager of the Commercial Electronics Group, is associate general manager. Mr. Jones, now headquartered in Cleveland, Ohio, will join Mr. Mohr at the group's new headquarters in Canoga Park, California.

JOHN C. MILLER has been appointed assistant to the advertising manager for the Frank G. Hough Co., Libertyville, Ill.

Prior to this appointment he was advertising manager for the W. L. Ballentine Company, Ltd., Toronto, Ont., a distributor for Hough. R. E. CONNOLLY continues as assistant ad manager.

GEORGE E. HALL has been appointed to the newly created position of manager, sales development, construction machinery division, Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

Mr. Hall will be responsible for product sales information, sales programs, market and application studies, as well as for coordinating advertising, exhibits, and trade shows. He was previously manager of the eastern region.

WHAT YOU CAN'T SEE MAKES THE DIFFERENCE IN SCREEN SECTIONS

The naked eye cannot see the difference in vibrating screen sections—they must be put in operation. The hidden values make the difference apparent.

Cleveland manufactures screen sections to your individual application with the emphasis on hidden values. Minimum wear, maximum strength, the desired ductility are a few of the extras you can't see but that are built into Cleveland screen sections. These, coupled with measured accuracy and continual high tonage, provide a practical screen for a profitable operation.

Write for Bulletin 160 containing complete specifications on space cloth and a how to order section on vibrating screens.

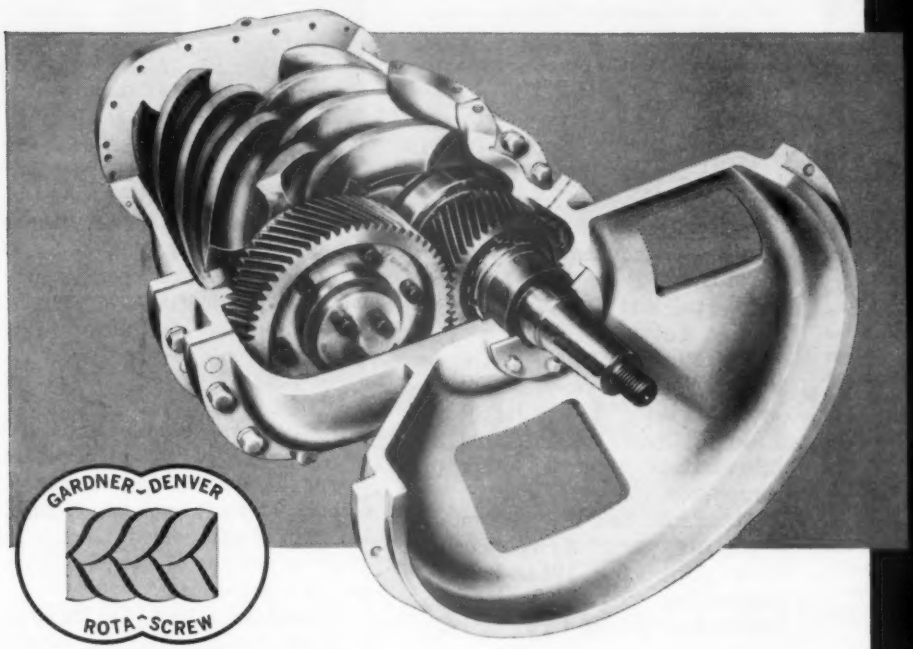
THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY

3574 East 78th Street • Cleveland 5, Ohio • Phone DI 1-1832

CLEVELAND WIRE CLOTH

Enter 166 on card, page 155

IN THIS GARDNER-DENVER ROTA-SCREW PORTABLE...



NO VANES TO REPLACE

NO TOUCHING PARTS IN CHAMBER

SINGLE-STAGE COMPRESSION

There's nothing to wear out in the air compression chamber

In quarry after quarry, this Gardner-Denver team helps lower costs and boost production. Ask your Gardner-Denver Specialist about the "Air Trac"® and new Rota-Screw portable compressors.

That's because there are no touching parts in the compressor. No valves, pistons or blades to inspect or replace—ever! Cuts maintenance to a trifle. Compressor stays on the job.

And that's why quarry men everywhere are using Gardner-Denver Rota-Screw portables on their operations.

Ask your Gardner-Denver Specialist about all the Rota-Screw advantages. Or write for Bulletin SP-1.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Gardner-Denver Company, Quincy, Ill.—Offices in principal U.S., Canadian and Mexican cities
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

International: Gardner-Denver International Division, 233 Broadway, New York 7, N.Y.
Offices: Buenos Aires, Argentina; Artarmon, N.S.W., Australia; Brussels, Belgium; Rio de Janeiro, Brazil; Santiago, Chile; Barranquilla, Colombia; Lima, Peru; Ndola, N. Rhodesia; Salisbury, S. Rhodesia; Johannesburg, Transvaal

• ESCO Corporation, Portland, Oreg., has been licensed by the United States Steel Corporation to produce USS "T-1" steel in the form of castings.

The addition of "T-1" steel to ESCO's line of casting alloys enables the company to meet the critical needs of customers in the high strength, low alloy field. In various rolled forms "T-1" is known for strength and field weldability. Cast "T-1" will have the same high strength properties as "T-1" mill products, in addition to offering flexibility of casting design, and making possible trim appearance, efficient function, and low cost.

William Barber, ESCO; James Rimmer and Jack England, U. S. Steel; and R. W. deWeese, vice-president of sales, ESCO, are shown discussing the betatron x-ray machine in the firm's Portland metallurgical laboratory. It will quality check the heavy castings of the new metal.

Martin A. Ceder, Inc., Louisville, Kentucky, has been appointed a Hyster Industrial Truck dealer for Hyster Company, Portland, Oreg.

The sales organization will represent Hyster Company's industrial truck division throughout Kentucky, and will also cover a 14 county area in Indiana, bordering on the Ohio River.

LEONARD C. ROSE has been elected executive vice-president and RUDOLPH SMITH has been elected executive vice-president, operations by the Board of Directors of The Colorado Fuel and Iron Corporation, Denver, Colo.

Mr. Rose had been serving as director of purchases for the corporation since 1947. He joined CF&I in Denver in 1929, and has held various positions within the corporation.

Mr. Smith had been serving as works manager of CF&I's Pueblo, Colo. plant since 1951. Prior to this he has served in various positions since joining CF&I in 1927.

RICHARD W. YERBURY, design engineer, has become a member of the product development department of Machinery Center, Inc., manufacturers of mining and milling equipment at Salt Lake City, Utah. Mr. Yerbury has designed and supervised the building of several mining rigs with extensive use of hydraulics, and of air-operated jumbos, and has had several years in the compressor and tractor fields.

R. W. Yerbury

SIMON POSEN has been promoted to the office of vice-president in charge of special assignments for Gilman Paper Company, Gilman, Vt., Mr. Posen joined Gilman in 1949 as director of the New York technical department.

STUART BERGMAN, for the past six years assistant director of the technical department, has been promoted to director of technical services.

Aztec Equipment Co., Phoenix, Ariz., has been appointed a distributor for the state of Arizona by the Kwik-Mix Co., Port Washington (Wis.) manufacturer of material handling and mixing machines. Kwik-Mix is a division of Koehring.

An agreement reached recently between The Canadian Fairbanks-Morse Company Limited, of Montreal, and Fairbanks, Morse & Co., Chicago, returns to the American company the ownership and use in Canada of the Fairbanks, Morse name and trademarks. Canadian Locomotive Company, a subsidiary of Fairbanks, Morse & Co. of Chicago with a minority interest publicly held by Canadian citizens, will now become the basic distributor in Canada of Fairbanks-Morse pumps, scales, and motor products and will market them in that country under the Fairbanks, Morse name.

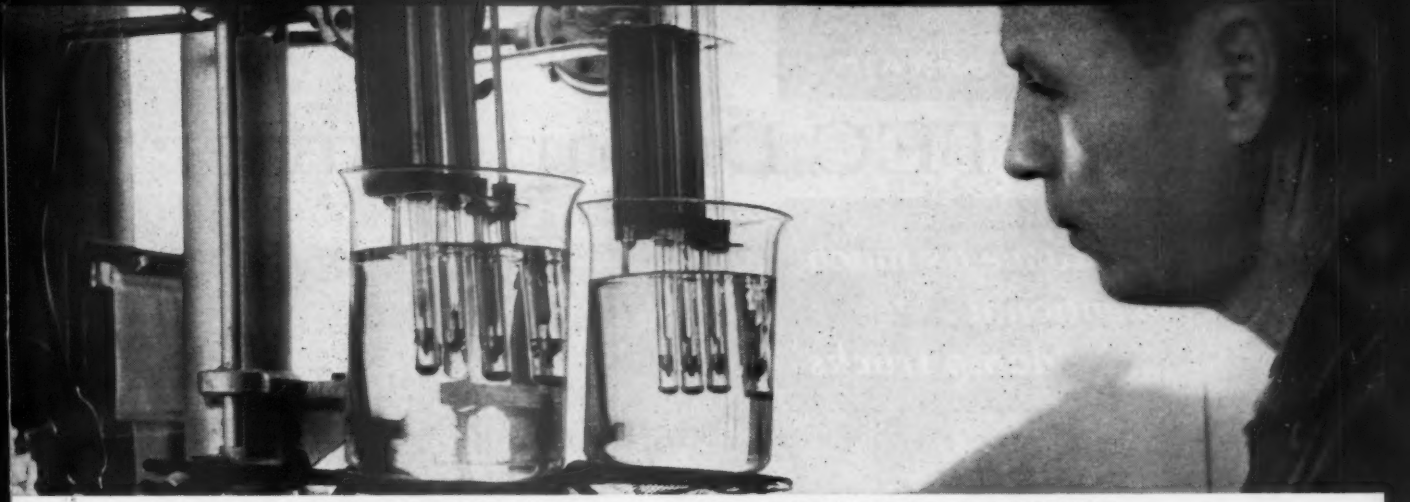
Put
BIG FOOTAGE
behind you...

on every shift with Brunner & Lay drilling tools. Carbide Rok-Bits on Brunner & Lay rods give longer feeds, fewer bit changes, straight ROUND, easy-to-load holes that increase blasting efficiency. All threads, all popular sizes, job fitted carbides to meet your exact needs. Proved on every type machine and job. Brunner & Lay, Inc., 9300 W. King St., Franklin Park, Ill. Plants & conversion shops from coast-to-coast.

Brunner & Lay

carbide ROK-BITS • DRILL RODS • INTRASET STEEL COUPLINGS, ADAPTERS, EXTENSION STEEL, STRIKING BARS. MOIL POINTS, CLAY SPADES, ASPHALT CUTTERS, etc.

Enter 168 on card, page 155



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390° F. All greases tested except Darina (second tube from left) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease AX that helps it last up to 3 times longer than soap-base greases

Darina® Grease AX is made with Microgel*, the new thickening agent developed by Shell Research.

Severely tested for 18 months, Darina AX with Microgel proved its ability to resist washout, even in mud and slush—stay smooth and buttery at high temperatures—and reduce maintenance.

Read how this superior new multi-purpose grease can help solve your lubricating problems.

THERE IS no soap in Darina Grease AX. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina AX uses Microgel—a development of Shell Research.

What Microgel does

Because of Microgel, Darina AX has no melting point. It won't run out of bearings.

Even compared to soap-base greases, Darina AX provides significantly greater protection under adverse service conditions.

Resists washout

Mix water into Darina AX and the grease maintains its consistency. It shrugs off water—won't emulsify. For fleets that must operate in snow, slush, rain or mud—Darina AX is an ideal choice.

Longer lubrication life

Shell scientists tested Darina AX, under wet conditions, in a special device called an Oscillating Friction Machine.

Darina AX kept its lubricating qualities twice as long as a premium soda soap-base grease; 2½ times longer than a calcium-soap grease; 3 times longer than an aluminum-soap grease.

Results of field test

In a recent field test, 15 firms used Darina AX in chassis and wheel bearings of over 1000 vehicles. These buses, trucks and vans rolled up 30,097,000 chassis miles. The results:

1. Every company was pleased with the performance of Darina AX.
2. There wasn't one wheel bearing failure due to grease deficiency.
3. In many cases, re-lubrication schedules could be extended.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 W. 50th St., N. Y. 20, N. Y.

*Registered Trademark

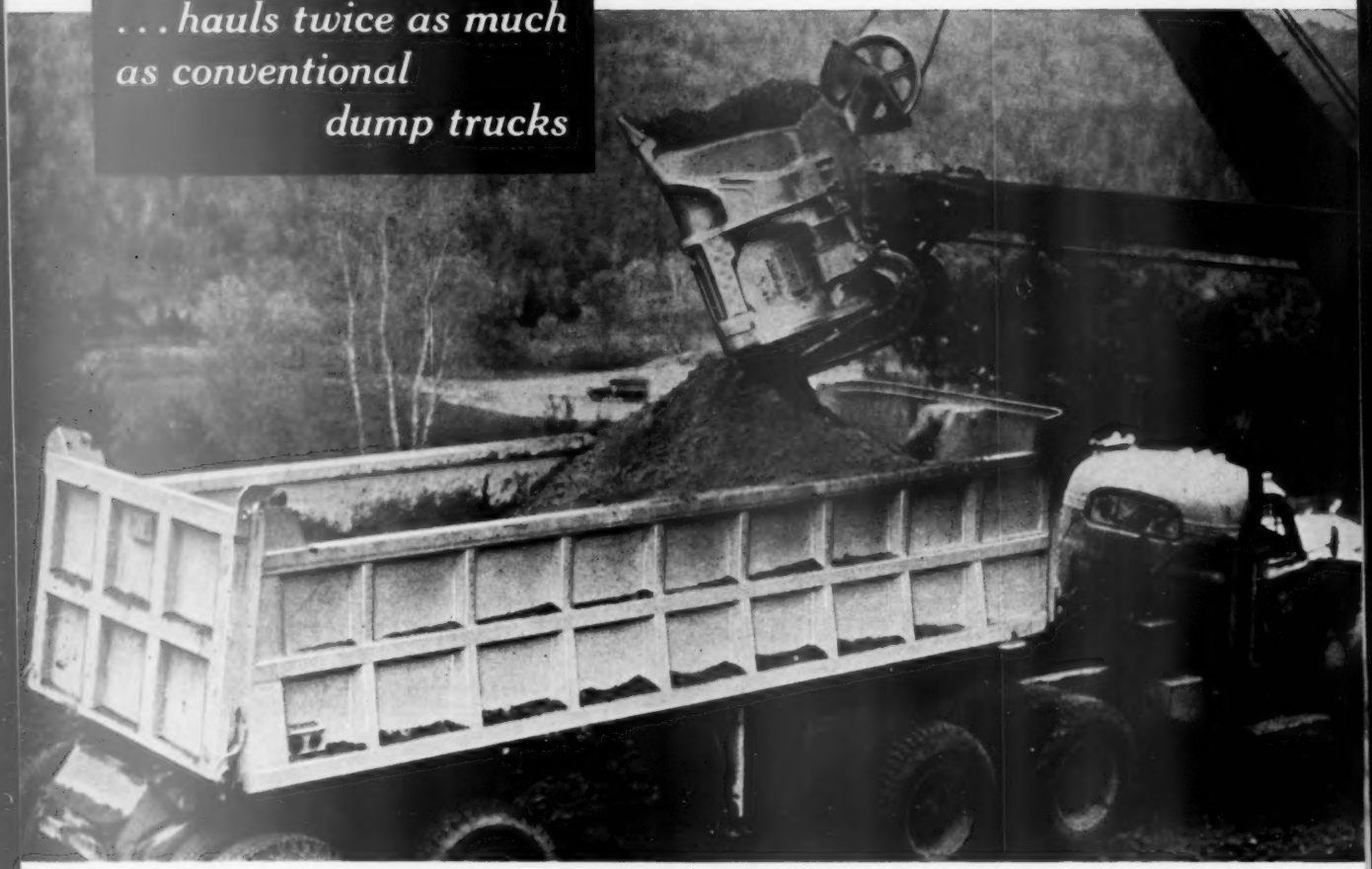
SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are helping to provide better products for industry

IN ROUGH TERRAIN—

HEIL-TEC Dump Trailer

. . . hauls twice as much as conventional dump trucks



In extremely rough terrain, this specially designed 20-yd, 18-wheel HY-SPILL frameless dump trailer hauled approximately *twice* the payloads that comparative 10-wheel dump trucks carried at about the same speed.

This outstanding performance was achieved for Landers & Griffin, Inc., Portsmouth, N. H., on their job in the heart of the White Mountains near Littleton, N. H.

"It is only because of the remarkable stability of the HY-SPILL design, along with the flotation of 18 tires and the traction of two axles, that such performance is possible," said a spokesman for Landers & Griffin. "If this was attempted with a conventional frame trailer, repeated tip-overs would be the result."

TEC offers unsurpassed know-how in dump trailer design. Every TEC unit is engineered for the kind of applications you specify and for the area where it will operate. Choice of single-axle and tandem semi-trailers for use with either single-axle or tandem tractors. Single-axle trailers are available in body lengths from 16 to 28 ft, and tandem-axle units in lengths from 20 to 34 ft.

HY-TEC FRAMELESS TYPE
U.S. Patent No. 2,846,267

HY-SPILL FRAMELESS TYPE
(Available Only From Heil)
U.S. Patent No. 2,853,341

Other on-the-job advantages of TEC design

- Exclusive HY-SPILL design holds front tandem wheels on ground while dumping . . . provides 38- to 40-in. spill height from end of body floor to ground for dumping into high hoppers, paving and spreading machines.
- Body can be raised or lowered while moving, with better stability than any other hauling unit.
- Trailer can be dumped while jackknifed, speeds dumping and turn-around in tight places.
- Exclusive design of TEC frameless dump trailers cuts dead weight . . . lets you haul up to 4,000 lb more payload — even more where longer axle spacing is desirable or when aluminum bodies are used.

TEC Division

THE HEIL CO.

DUMP BODIES and HOISTS

TEC Division, 1285 West 70th Street, Cleveland 2, Ohio

F. C. SCHULZE has been advanced to the post of vice-president, sales, for the Waukesha Motor Company, Waukesha, Wis. The announcement was made by C. E. NELSON, president, following a recent meeting of the company's board of directors.

F. C. Schulze

Mr. Schulze joined the Waukesha Motor Company in 1928, was named assistant sales manager in 1938, and general sales manager in 1949.

THOMAS WELFER has been elected secretary of Harbison-Walker Refractories Company, Pittsburgh, Pa., by the board of directors.

He succeeds G. F. CRONMILLER JR., who retired as vice-president and secretary after 48 years of service.

T. Welfer

Mr. Welfer came to Harbison-Walker in 1942, starting as a clerk in the Hays Works office. He was transferred to industrial relations in 1945. In 1953, he became assistant general counsel and he will continue to hold this position in addition to assuming his new duties. July P&Q LC mfrs. news

Schweiger's, Inc., Watertown, S. D., has been appointed distributor for Highway Equipment Company, Cedar Rapids, Iowa.

Three promotions within the Pacific Northwest sales organization of Motorola Communications and Electronics, Inc., Chicago, Ill., have been announced.

JOSEPH V. GUIDO has been named regional sales manager in the Pacific Northwest. He will supervise the sale of 2-way radio and other communications products. Mr. Guido, who joined Motorola in the Seattle area in 1956, had previously been an account representative to large users.

D. EDWARD WILLIAMS succeeds Mr. Guido as account executive in Washington and Oregon. With Motorola seven years, Mr. Williams most recently was zone manager in Seattle.

ROBERT H. MAKI moves into Mr. Williams' former position of zone manager. He has been with Motorola since 1958.

Mooney Tractor & Equipment Corporation, Milwaukee, Wis., has been appointed dealer for P&H construction and mining equipment manufactured by Harnischfeger Corp., also of Milwaukee. The new dealership will cover the entire state of Wisconsin.

WARREN J. HOLEHOUSE has been appointed assistant sales manager, Stearns Magnetic Products Division of Indiana General Corporation, Milwaukee, Wis. He will act as liaison between the Stearns home office and field sales offices, and will also oversee current product developments, and changes and additions in representative sales organizations.

DAVID W. MARCHANT has been promoted from president and general manager of Koehring-Waterous Ltd., Brantford, Ont., to president and general manager of Koehring Division, Milwaukee, Wis., and KENSAL R. CHANDLER to president and general manager of Koehring-Waterous from assistant vice-president of sales, Koehring Division.

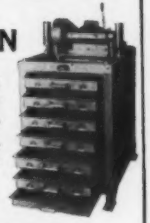
Mr. Marchant succeeds E. A. BRUGGER, who has been assigned abroad in connection with the company's European and overseas activities.

J. B. Hunt & Sons, Inc., Raleigh, N. C., has been appointed exclusive dealer for asphalt plants in North Carolina for Standard Steel Corporation, Los Angeles, Calif.

GILSON

TESTING SCREEN

Controls and guarantees your product. Fast, accurate, trouble-free test sizing of crushed stone, sand, gravel, slag, etc. Size range: 4-in. to 200-mesh.



SAMPLE SPLITTER

Reduces large samples for convenient testing. Adjusts for all materials, sand to heavy aggregate. Simple to use. Heavy welded steel construction.

Porta Screen

Portable. Motor or hand driven. Operates free-standing. Samples up to 25 lbs., 1½-in. to 200-mesh. Does not replace GILSON Testing Screen for heavy-duty test sizing.

Write for detailed literature

GILSON SCREEN CO.
MALINTA, OHIO

Enter 171-A on card, page 155

. . determine
SUB-SOIL LAYERS

LOW PRICE
$575.00
Model 274M
"Michimho"
ELECTRO-GROUND

Shows
Material • Location • Quantity

Complete determinations of sub-soil layers are made with this 20-lb instrument. Location and composition of layers 100-ft. or more below the surface can be accurately plotted.
For locating gravel deposits, data on bedrock in cut areas, and sub-soil stability for construction plans.

Write for
New Manual E-63 containing complete operating data
1-35.6

ASSOCIATED RESEARCH, Incorporated
3790 W. Belmont Avenue • Chicago 18, Illinois

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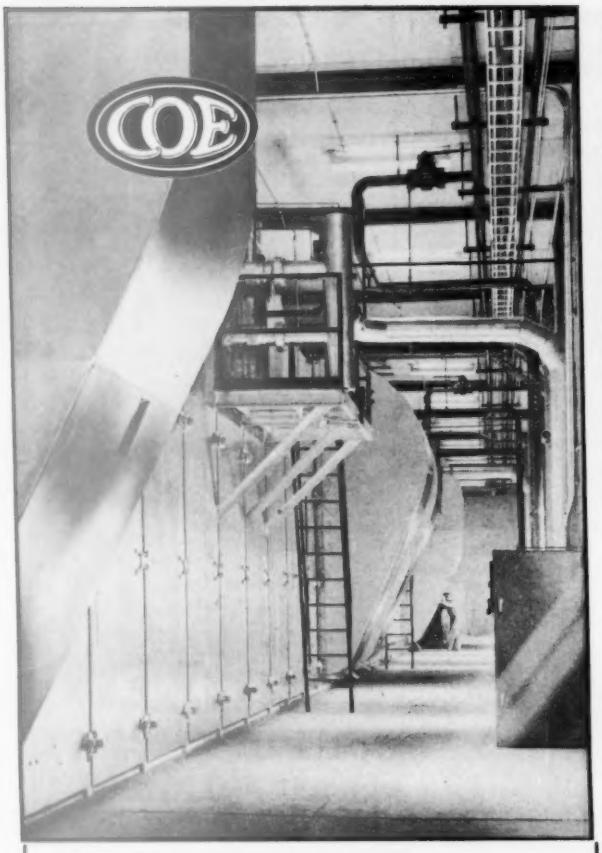

BIG HORN GYPSUM CO.

is Forging Forward

WITH

COE **EQUIPMENT**

With confidence and assurance, Big Horn has established themselves in an ideal location to serve the constantly growing Central Western states and the Pacific Northwest.

Confidence is provided by the plant and equipment which has been designed and built by the best specialized engineering talent available. Assurance is afforded by the experienced management and personnel that are devoting themselves to the manufacture of quality gypsum board.

In addition to the 8 deck dryer almost 300 feet long, a portion of which is shown in the illustration above, Coe was honored to supply much of the latest design automatic machines ahead of the dryer and for handling board to and through subsequent processing operations.

The COE MFG. CO.

PAINESVILLE, OHIO PORTLAND, OREGON

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Furnishes a positive seal for round flexible joints. Used by leading dredging and hydraulic sand-and-gravel operators, and the U. S. Engineering Corps. This Multi-use chain sleeve clamp is easy to apply . . . positive in action. Write for illustrated folder, today.

The Black Brothers Co., Inc., 501 9th Ave., Mendota, Ill.

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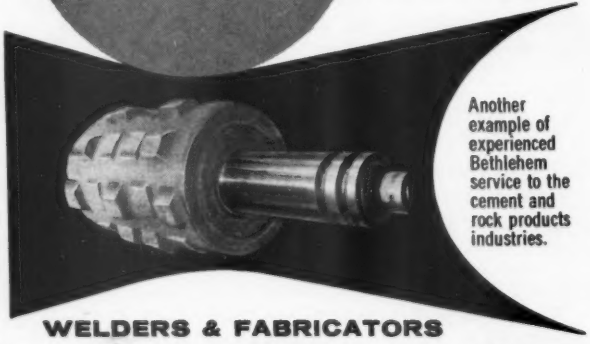
CRUSHER ROLL AND SHAFT REBUILT BY BETHLEHEM*

with **WELD METAL**, re-machined & hard faced.



Another example of experienced Bethlehem service to the cement and rock products industries.

WELDERS & FABRICATORS

Complete Kiln Replacement Parts	Bushings	Feed Pipes
Agitator Parts	Conveyor Screws	Gears, Pinions
Babbitt Shells for Bearings	Couplings	Gear Housings
Base Plates	Drag Chain	Hammermill Parts
	Elevator Chain, Buckets, Casings	

CEMENT MILL MACHINERY DIV.

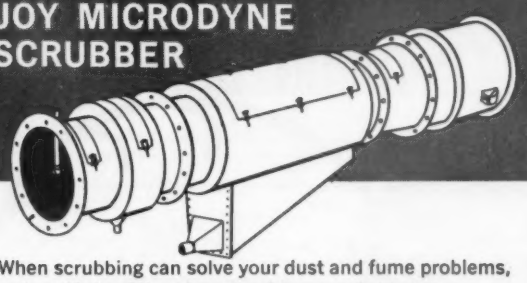
*BETHLEHEM FOUNDRY AND MACHINE CO., BETHLEHEM, PENNA.

Est. 1856 Phone UNiversity 7-4605

Enter 172-C on card, page 155

The COMPACT dust collector that fits into 1/10th the space!

JOY MICRODYNE SCRUBBER



When scrubbing can solve your dust and fume problems, only a WP **Joy Microdyne Scrubber** can do the job so efficiently in so little space.

Needs only a fraction of the space of other collectors . . . weighs far less . . . yet delivers highest efficiency. Installs in existing duct system, in horizontal or vertical position . . . often at the dust source. Steel or corrosion resistant alloy construction.

WRITE FOR LITERATURE today to Western Precipitation, 1000 W. 9th St., Los Angeles 54, Calif. (In Canada, write 8285 Mountain Sights Ave., Montreal, P. Q.)

DUST AND FUME CONTROL SINCE 1907

WESTERN PRECIPITATION

DIVISION OF JOY MANUFACTURING COMPANY

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FOR BEST RESULTS ADVERTISE IN **PIT AND QUARRY'S**

Broadcast Section

"THE MARKETPLACE OF THE INDUSTRY"

CONTRACT CORE DRILLING

EXPLORATION FOR MINERAL DEPOSITS
INCLUDING URANIUM & LIMESTONE — ANYWHERE

FOUNDATION TEST BORING

GROUT HOLE DRILLING

Skilled crews and complete stock of core drills and accessory equipment maintained at all times

Core Drill Contractors for more than 60 years

JOY MANUFACTURING CO.
Contract Core Drill Division
MICHIGAN CITY, INDIANA

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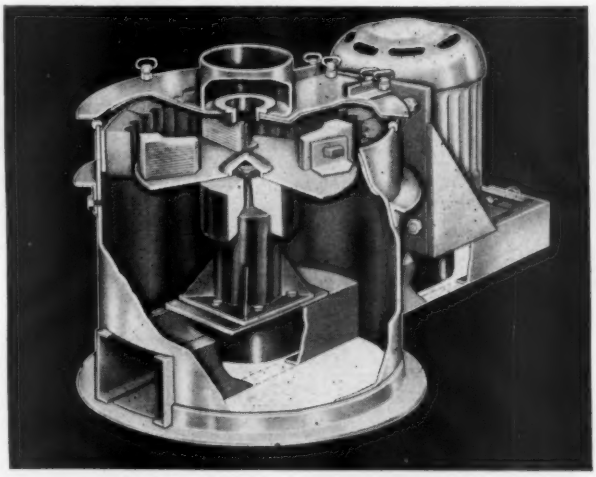
HAVE YOU CHECKED THE NEW, BETTER WAY TO CRUSH?

enthusiastic users say the

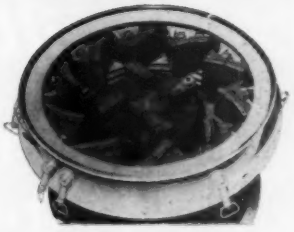
TORNADO

SQUARE IMPACT CRUSHER

turns out a dense graded cubical product—yet it is the most versatile crusher ever put on the market. Produces any range of crushing, to screen



to any gradation required, in an almost unbelievable number of tons per hour, and does it at less cost than Rod Mills or other types of Crushers priced up to TEN TIMES AS MUCH!



Virtually no "down time"—you can keep it in operation 22½ hours a day, 7 days a week, year after year.

Light in weight—requires no massive foundation and little head room. Power requirement amazingly low. No zincing or babbitting needed.

Write, wire, or phone collect for details. We'll run a sample of your own material through the Tornado to PROVE how much it will do for you.

WERCO Steel Company

2151 East 83rd Street, Chicago 17, Ill.
Phone ESsex 5-8446
Cable Address, IMPACTOR

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Where dryer shells are subject to extremely high gas temperatures as in asphalt plants, sand dryers, etc., you can eliminate costly repairs with a

McDERMOTT-DESIGNED ROLLER CHAIN DRIVE

SPECIAL DESIGNS FOR SPECIAL APPLICATIONS

The dryer shell, saddled between the driving sprockets, is clear at all times from ring gear and pinion. This 8′ dia. x 20′ dryer, designed by McDermott for an asphalt plant, is operating continuously without trouble or downtime.

McDermott
BROS. CO., INC.
ALLENTOWN, PA.—Phone HEmlock 3-3231

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Ranite IS STILL THE BEST!

HAVE YOU COMPARED IT
WITH THE HARD-SURFACING ROD
YOU ARE NOW USING?

IT PAYS TO KNOW!

WRITE FOR INFORMATION OR SEE YOUR RANITE DISTRIBUTOR

RANKIN MANUFACTURING COMPANY
616 SOUTH MARENGO AVENUE • P. O. BOX 631 • ALHAMBRA, CALIFORNIA

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$11.50 per column inch. Lower rates for larger space used and/or on contract basis.

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Used equipment, employment and professional ads only are eligible for classified advertising rates.

PIT & QUARRY
431 S. Dearborn St. Chicago 5, Ill.

BROADCAST

Section

SUPERVISING CHEMIST

A graduate engineer familiar with Portland Cement chemistry and with the properties of concrete to the extent required to fill the post of supervising chemist. Must also have cement plant operating experience. Ability to read technical German preferred. All replies confidential.

Box No. PQ-173-H, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Illinois

WANTED

Need concrete products plant superintendent, packerhead, spun and vibracast; also concrete block. Send all qualifications, education and experience records. Location—Pacific Coast. Replies confidential.

Box No. PQ-158-G, c/o Pit and Quarry Publications
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Salesman — Wanted

With rapidly growing organization. Must have following in Pit & Quarry & Mining trades. Exceptional opportunity to increase present income—All inquiries strictly confidential.

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Mineral exploration — geophysical surveys — reserves evaluation — groundwater studies — soils — engineering geology — earth materials — aggregates.

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We do
CONTRACT DRILLING
Anywhere
SPECIALIZING IN QUARRY BLAST HOLES USING
INGERSOLL-RAND DRILLMASTERS
Hole sizes from 4¾" through 6½"
NEW JERSEY DRILLING COMPANY
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BIG HORN GYPSUM CO'S.
NEW PLANT DESIGNED BY

JOHNSON & JOHNSON
ENGINEERS & ARCHITECTS, INC.
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PLANT LAYOUT
COST ESTIMATES
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OPERATING COSTS
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CEMENT PLANTS
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CHEMICAL PLANTS

GENERAL MANAGER

Crushed Stone Quarry Operation

- **Ready Mix and Bituminous Concrete**
- **Precast Pipe and Prestressed Concrete**

Nationally known diversified operation has immediate opening for proven management executive experienced in this field.

The man we seek must have had responsibility for the direction and management of all phases of the business—mining, manufacturing, distribution, purchasing, sales and administration services; as well as ability to promote growth from present $4,000,000 annual sales to its highest potential in active market area.

Salary, and supplemental benefits program will be commensurate with experience and responsibility. Position offers good opportunity for advancement to successful applicant. Send complete resume of your experience, education and other qualifications to:

Box No. PQ-177-H, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Illinois

WANTED

DISTRIBUTORS to market our complete line of custom-built Vibrating Screen Units throughout U.S.A. 35 Yr. old Heavy Duty "NIA-TEX" Line (Positive-throw). 22 Yr. old Light Duty "RUMBA" Line. Exclusive franchise to Industry you now serve. Liberal Commissions. Furnish complete resume to:

HUTCHISON MFG. CO.

Box 9335 Houston 11, Texas

CHIEF CHEMIST

Chief Chemist needed for a 4000 bbl. per day NEW Cement Plant in Houston, Texas.

***Contact* E. B. GOOD**

Box 1321, Houston, Texas, Phone: CA 2-9161

WANTED

Well-established manufacturer of complete line concrete batching equipment; bins, silos, conveyors, etc. Desires active distributors. Attractive compensation arrangement and protected territory if desired.

Write to

Box No. PQ-147-F, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Ill.

POSITION WANTED

Mining Engineer age 46 desires position in mineral or rock production. 20 years experience mining, quarrying and engineering.

Box No. PQ-141-E, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Illinois

PLANT MANAGER

Plant Manager needed for a 4000 bbl. per day NEW Cement Plant in Houston Texas.

***Contact* E. B. GOOD**

Box 1321, Houston, Texas, Phone: CA 2-9161

ENGINEER DESIGNER

Permanent career opportunity for qualified engineer experienced in design and operation of aggregate plants, central mix concrete plants, and related materials facilities. East coast location with multi-plant operator.

Box No. PQ-170-H, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Illinois

FOREMAN WANTED

Mosaic precast concrete foreman needed; prestressed concrete experience also desirable. Send all qualifications, including education and experience records. Location—Pacific Coast. Replies confidential.

Box No. PQ-159-G, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Illinois

QUARRY SUPERVISOR

Mining Engineer, Age 33, Experienced in quarry administration, engineering, and operations including stripping, drilling, blasting, and hauling in quarry and crushing, screening, and washing in processing plant. Also acquainted with concrete and blacktop plants.

Box No. PQ-171-H, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Illinois

Cat D 337 Power Unit, complete radiator to clutch shaft Completely rebuilt by Cat Dealer. Price **$2,900.**

WILKINSON EQUIPMENT

Ashtabula, Ohio Phone 993-2129

FOR SALE

Complete lightweight aggregate plant. Annual capacity approximately 125,000 cu. yds. Can be moved. *Write:*

BESLITE AGGREGATES

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FOR SALE

Rock - Lime - Phosphate Business and Crushing Plant. Two Quarries. Calcium Rock Tests 96 to 98%. 4 counties—Closest plant 22 miles.

ELDON QUARRY CO., INC.

P.O. Box 15 Eldon, Missouri

3—10'x78' Dryers—2'3'4'5½'7' Symons and Telsmith Cone Crushers—3643-4042-4872 Jaw Crushers and smaller sizes—48" & 20" Gyratory Vibrating Feeders—other types of Feeders—Eagle Fine & Coarse Material Washers—Dixie Non Clog moving plate Hammermills—Asphalt Plants— Jaw —Cone— Gyratory— Roll Double and Triple—Hammermill and Impact Crushers —Ball—Rod—Tube Mills—Screening, Washing and Crushing Plants, Classifiers, Compressors, Conveyors, Cranes, Drills, Dump Cars, Dredges, Feeders, Hoists, Motors, Generators, Kilns, Dryers, Locomotives, Pumps, Screens, Shovels, Draglines, Transformers, Euclid Trucks.

STANLEY B. TROYER EQUIPMENT CO.

Phone Off. 546-6477 Res. 546-5954
Box 97 Crosby, Minnesota

WANTED

Two sales representatives familiar with the cement and mining industries for sales of forged steel and Ni-Hard grinding balls; gray iron, white iron, and Ni-Hard castings.

One representative for midwest and western states and one for southern states.

Sales on attractive commission basis.

Send resume, qualifications, commission expected, etc. to

Box No. PQ-168-H, c/o Pit and Quarry Publications
431 So. Dearborn St. Chicago 5, Illinois

Superintendent Crushed Stone Operation

Nationally known diversified corporation has immediate opening for a superintendent in one of its quarry and bituminous concrete operations.

Experience in this type operation with responsibility for production, maintenance, quality, labor relations, etc. is essential to qualify.

Salary and supplemental benefits program will be commensurate with experience and responsibility. Send complete resume of your experience, education and other qualifications to

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FOR SALE

2—Bonnot rotary kilns, 8' x 115', complete with motors and drives and all auxiliary equipment, ⅝" material.

1—Bonnot steel rotary cooler, 8' x 50', complete with drive and motor, ⅝" material.

R. GELB & SONS, INC.

U. S. Highway 22 Union, N. J.
Murdock 6-4900

LIME, CLAY & COAL OPERATION

ONLY ONE IN THREE COUNTY AREA

Over one hundred acres of high calcium stone under lease.

Shovels, trucks, dozers and processing equipment.

Twenty foot vein of clay with contract to Brick Company.

Twenty-eight inch vein of coal.

For immediate sale for $125,000.

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JAMES NETHERS

Route 1 Walhonding, Ohio

BONDED QUALITY BARGAINS

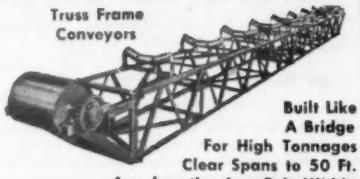
FOR INCREASED PROFITS AND LOWER OPERATING COST

CURRENT MODELS - IMMEDIATE SHIPMENT FROM OUR FACTORY - WRITE, WIRE OR PHONE FOR FREE CATALOG AND PRICES

BONDED ® TROUGHING IDLER CONVEYOR BARGAINS

8" Jr. I Beam Frame Conveyors

Truss Frame Conveyors



Built Like A Bridge For High Tonnages Clear Spans to 50 Ft. Any Length - Any Belt Width.

Bonded Pre-Fab conveyors are designed to give you fast, efficient and economical movement of your bulk materials at low cost, with a minimum of maintenance. Sand, Gravel, Crushed Stone, Chemicals, Fertilizer and Coal are just a few of the materials that can be transported on these conveyors.

Three different designs offer a wide choice to fit the particular application and budget. All are jig built for quick, easy installation.

BONDED 8" JR. I-BEAM CONVEYOR. A low cost unit for moderate speeds and capacities. Ideal for low headroom installations above or below ground.

BONDED TRUSS FRAME CONVEYORS. Available in 18" and 30" deep frame. Built like a bridge. For heavy loads, higher speeds and capacities, clear spans to 50 feet. This will vary with depth of truss, accessories required, etc.

We take our loss on our stock of short length belting. You can save as much as 50% on **BONDED CONVEYORS** with conveyor belting in two pieces. Belt is new stock, guaranteed to meet listed specifications.

A full line of accessories is always available, including carrying and return belt covers.

REMEMBER. YOU SAVE UP TO 50%— CONVEYOR PRICES INCLUDE BELTING.

8" JR. I BEAM FRAME CONVEYOR

Belt Width	Conveyor Length	Price	Add or Deduct Per Foot
14"	25'	$ 766	$16.62
16"	25'	786	17.10
18"	25'	830	18.03
20"	25'	871	19.30
24"	25'	922	20.88
30"	25'	1012	23.17
36"	25'	1105	25.91

WRITE FOR BULLETIN #1138

TRUSS FRAME CONVEYOR

18" TRUSS		30" TRUSS	
Price	Add or Deduct Per Five Feet	Price	Add or Deduct Per Five Feet
$901	$94.80	$965	$109.00
923	97.89	987	112.00
959	102.42	1104	117.20
998	109.45	1150	123.81
1067	116.24	1201	130.66
1140	129.37	1297	144.18
		1393	157.64

WRITE FOR BULLETIN #1189

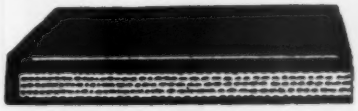
TESTED CONVEYOR BELTING

WE PAY FREIGHT ON 200 POUNDS AND OVER. QUANTITY DISCOUNTS ON 150' AND OVER.

Guaranteed to meet listed specifications. Tested by the Engineering Laboratory of one of the largest universities in the U.S.

Other widths, plies, duck weights and cover thickness available at low prices.

WRITE FOR FREE SAMPLE & BULL. #1278



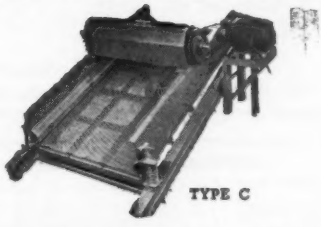
MAJOR BRAND: 12# to 15# Friction Pull. 800# to 1000# cover Tensile. Heavy Duty. 28 oz. Cotton Nylon Duck. Used in moving boxes, bags, coal, sand, gravel, crushed stone, refined sugar, salt, coke, earth and materials when abrasion is not too severe.

Width	Ply	Top and Bottom Covers	U. S. Made Per Foot
12"	3	1/16"x1/32"	$2.31
18"	3	1/16"x1/32"	2.88
14"	4	1/8"x1/32"	3.06
16"	4	1/8"x1/32"	3.21
18"	4	1/8"x1/32"	3.56
20"	4	1/8"x1/32"	4.11
24"	4	1/8"x1/32"	4.61
30"	4	1/8"x1/32"	5.64
36"	4	1/8"x1/32"	6.69

MAJOR BEE BRAND: 16# to 19# Friction Pull. 2400# to 3000# Cover Tensile. Heavy Duty. 28 oz. Duck. **Domestic belt has cotton nylon Duck. Imported belt has cotton Duck.** 1/8" top rubber cover x 1/32 bottom rubber cover. For more severe service, high tonnages and abrasion resistance. For hauling stone, mineral ore, concrete, cement, coal and other similar materials, both wet and dry.

Width	Ply	U.S. Made Per Foot	Imported Belt Per Foot
14"	4	$3.31	$3.17
16"	4	3.74	3.36
18"	4	4.14	3.73
20"	4	4.72	4.32
24"	4	5.35	4.86
30"	4	6.56	5.98
36"	4	7.95	6.95
24"	5	6.25	5.63
The Following Have 1/16" Top Rubber Cover x 1/32" Bottom Rubber Cover:			
12"	3		$2.41
18"	3		3.23
24"	3		4.24

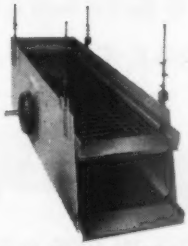
NEW BONDED® SPECIAL SERVICE & HEAVY DUTY VIBRATING SCREENS



TYPE C

- ✓ LOW PRICES
- ✓ HIGH CAPACITIES
- ✓ FACTORY TESTED & BALANCED
- ✓ CONTROLLED VIBRATION
- ✓ SHARP, CLEAN SEPARATION
- ✓ CONTINUOUS OPERATION
- ✓ REVERSIBLE SCREEN CLOTH FOR LONGER LIFE
- ✓ LOW MAINTENANCE

SPECIAL SERVICE SCREEN, Type C. Series 2 with opening in top deck up to 2" for scalping, etc. Series 1 for fine screening and dedusting. Ideal for portable or temporary installations. 2'x4' to 3'x8'. 1 to 3 decks. **WRITE FOR BULLETIN #1224.**



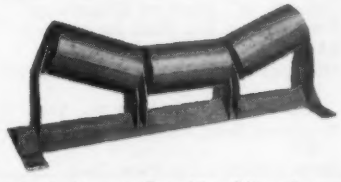
TYPE TB

Heavy Duty Models, Type TB; two-bearing, positive throw, eccentric shaft screens, suspension mounting. 3'x6' to 4'x14', 1 to 5 decks. Prices for base mounting and 4-bearing screens on request. **WRITE FOR BULLETINS #1087 and #1279.**

Model Number	Screening Area	Number of Decks	Price
124C	2'x4'	1	$ 487
224C	2'x4'	2	519
324C	2'x4'	3	616
126C	2'x6'	1	519
226C	2'x6'	2	551
326C	2'x6'	3	680
136C	3'x6'	1	639
236C	3'x6'	2	757
336C	3'x6'	3	1052
138C	3'x8'	1	743
238C	3'x8'	2	897
338C	3'x8'	3	1096
136TB	3'x6'	1	1249
236TB	3'x6'	2	1316
336TB	3'x6'	3	1393
138TB	3'x8'	1	1290
238TB	3'x8'	2	1393
338TB	3'x8'	3	1429
2410TB	4'x10'	2	1112
3410TB	4'x10'	3	2244
2412TB	4'x12'	2	2278
3421TB	4'x12'	3	2614

Other sizes available. Prices quoted on request.

BONDED® IDLERS & RETURN ROLLS



3-roll, 5" diameter Troughing Idlers for:			
14" belt	$19.75	24" belt	$22.75
16" belt	20.50	30" belt	23.85
18" belt	21.90	36" belt	24.90
20" belt	22.10	48" belt	27.50
1-roll, 5" diameter Return Rolls for:			
14" belt	$ 8.50	24" belt	$11.00
16" belt	9.00	30" belt	12.50
18" belt	9.50	36" belt	13.75
20" belt	10.00	48" belt	16.50

All steel. Interchangeable with other well-known makes. Furnished with replaceable prelubricated sealed ball bearings. Maintenance is negligible. **WRITE FOR BULLETIN #1138.**

BONDED SCALE AND MACHINE COMPANY

PHONE Days: Hickory 4-2186 **WRITE FOR FREE CATALOG AND PRICES** **PHONE Evenings: AX. 1-2213 or BEimont 7-7728**

110 BELLEVUE **Mfrs. of Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers, Feeders and Bucket Elevators** **COLUMBUS 7, OHIO**

FOR SALE

INSLEY GUY DERRICK

Rated Cap.—6 Ton

Mast	— 95′	2 Sections — 32′ — 6″ 1 Section — 30′ — 0″
Boom	— 80′	2 Sections — 30′ — 0″ 1 Section — 20′ — 0″

Powered by 3 drum electric Hoisting Engine, also has power swingers.

Priced for IMMEDIATE sale.

Call or Write:

REPP AND MUNDT, INC.

1604 Cottage Avenue — Columbus, Indiana

BARGAIN FROM IOWA

20x36 RB Primary Jaw Crusher in excellent condition, Cedarapids. 3x12 feeder, 30″ belt, pneu. tires, air brakes.

Wash Plant—5x24 Rotary screen, 4x16′ sand drag & miscellaneous washing equipment.

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1—Turbo Blower—Spencer, Serial # 158530, #3020H, 850 C.F.N., 8″ Discharge, 8″ Intake with 20 h.p. unicloased asbestos protected motor, 220/440 volt, 3 phase—60 cycle, 3600 rpm

1—Bliss #40, L2490, Bliss Burner, 8.4 million B.T.U. capacity. Manual control.

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Keystone, South Dakota

Used Equipment For Sale

4500 Marion Dragline, 4 yd., 140′, 386 Cat. Diesel
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General Shovel, ¾ yd., diesel engine
General-Marion Shovel ¾ yd., 371 G.M. Diesel
15438 Northwest Shovel, ¾ yd., Buda gas engine

CRUSHING EQUIPMENT
New Holland 5050 Double Impeller Crusher
Pioneer 2436 Jaw Crusher
Cedarapids 2020 Double Impeller Crusher
Eagle 24″ Hammermill
Universal 4136 Hammermill
Cedarapids 1524 portable primary jaw crusher
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McLanahan 24″ x 25′ Single Screw Washer
McLanahan 5′ x 18′ revolving Hi-speed Scrubber

Aggregates Equipment, Inc.
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Diamond Drills—1½″, Jack Hammers, Stone Polishers, Marble Cutting Saws

CAPITAL EQUIPMENT CORP.
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LIQUIDATING

1—Allis Chalmers SS rotary dryer, 6′x50′, complete
2—Louisville SS rotary dryers, 8′x50′, complete
1—Louisville rotary steam tube dryer, 8′x45′.
6—Rotary dryers, 2 tires, ⅛″ shell, complete, 7′x60′ 6′x64′, 6′x56′, 6′x50′, 6′x35′, 4′x20′.
10—Pacific vert. feed reciprocating pumps. 10 to 340 GPM, complete with motors
1—Durr DSFR-2 Classifier, 3′x20′6″x2½″ slope
1—Hardinge pilot size ball mill, 24″x8″ complete.
1—Patterson rod mill, 4′x11′6″
1—Steel batch type ball mill, 8′x8′ with steel balls and 50 hp motor.

R. GELB & SONS, Inc.
U. S. Highway No. 22 — Union, N. J.

FOR SALE

50-Ton Whitcomb Diesel Electric Locomotive. Serial No. 61095, Type 0-4-4-0, 56½″ Gauge, Powered by Hercules DFXC Engines, 5¾″ x 6″. Clean and in Excellent Condition. Located Sparrows Point, Maryland.

PRICE $20,000.00

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501 St. Paul Place — Baltimore 2, Md.

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CRUSHERS
Penna. CF3-38 Reversible Impactor
Stedman 36″ Single Cage Mill
Telsmith 36″ Standard Gyrasphere
Farrell—New Ecc. Shaft for 42″ Jaw

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Michigan TMCT-16 Truck Cranes 25′ Boom
Lorain 75 Stick & Bucket 1¼ Yd.
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Allis-Chalmers 5 x 12 Low Head Single Deck with Step Deck Pockets
Telsmith 3 x 10 Triple Deck
Rotex Sifter 5 x 7 Single Deck

MISCELLANEOUS
Car Pullers 5 & 7½ HP
Hoffman Vacuum Cleaners 7½ & 10 HP
Chambers Pug Mill 28″ x 14′
Hughes Double Drop Deck Semi-Trailer

ELECTRIC MOTORS
25 Sleeve Bearing Squirrel Cage 440/3/60, 3 HP to 75 HP

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Plymouth Meeting, Pa.

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Weightometer, Merrick Type S, for 12″ belt, complete with feeder 5′3″ on center; powered by ½ HP, G.E. explosion proof motor with speed reducer and roller chain drive.

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CRUSHING EQUIPMENT

Gravel Plant	9x36 jaw, 3x10 screen, on pneumatics, @ $4,750.
Jaw Crusher	A-W 1024 jaw, roller bearing.
Power Unit	Cat D8800 Diesel, Clutch, OB Bearing.

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ROCKFORD, ILLINOIS
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New & Used . . . At Discount

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Models HCS, 265 GVW, 60,000 lb., 145 Waukesha Engine, 3 Way Auxiliary Tractor or for Mounting Crane.

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Acres of Trucks & Parts

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2—GENERAL MOTORS Diesel Engines, Model 8-278A. 600 RPM, with General Electric Generators, 350 KW, 450 volts AC, 3-phase, 60 cycles, and with G.E. Exciter, 8 KW, 120 volts D.C.

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Heavy Media Coal Wash PLANT
Univ. 293Q, CR2236 w/4½' cone, Pioneer 24V. 305W, Univ 880 Jr. 2036 Port Crushing PLANTS. Wash Plant w/5x21' scrubber.
CRUSHERS: 9x8, 1036, 1536, 2436, 3042, 4042, 4248, 6684 JAW. 322R Allis. 25½ & 37½ KVS. 13A Telsmith, 16", 2'4", 3' & 4' Traylor GYR. 36S & 48S Telsmith CONES. Sgl & Dbl ROLLS.
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6000' h/d 42" Conveyor BELTING
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Two—24" x 30' McLanahan dbl LOG WASHERS
5x17 & 5x21 Rotary DRYERS or COOLERS
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2½ yd. 24" ga. Dump CARS. GE 25 ton diesel elec. LOCOMOTIVES (2)
EXCAVATORS: Link Belt LS51, 85, 98. Manitowoc 2000B, 3500, 4500. Marion 7200. Bucyrus 38B, 51B, 54B, 71B.

MID-CONTINENT EQUIPMENT CO., INC.

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18 V PIONEER DUPLEX PORTABLE CRUSHING AND SCREENING PLANT

10" x 24" RB Jaw Crusher
24" x 16" RB Roll Crusher
30" x 8' 3½ Deck Screen
GMC Diesel Pneumatic Tires Excellent condition

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Rated Capacity—10 tons per min.
Model 18 HR Serial 7108
Used-Operating Condition

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1—Raymond #5047 High Side 4 Roll Mill, 5'6" dia. whizzer, complete.

1—#1 Raymond Impact Pulverizer, 5' dia. whizzer, complete.

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2—Raymond 16' and 14' dia. single whizzer.
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1—Raymond 12' dia. double whizzer, 50 HP.

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1—Vulcan 7' x 80' Rotary Dryer, ½" shell.
2—Fuller 6'6" x 60' Rotary Dryers, ½" shell.
2—Vulcan 6' x 60' Rotary Dryers, ⅜" shell.
2—Vulcan 5½' x 4½' x 60' Rotary Dryers, ⅜" shell.

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1—8" type B with 75 HP motor.
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1—6" type E with 50 HP motor.
2—6" type H with 30 HP motors.
1—5" type H with 25 HP motor.
150'—8" Fuller Huron Airslide with Spencer Blower.

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1—Pennsylvania Super-Thor Hammermill, SXT-15 with 250 HP motor.
1—Pennsylvania Reversible Impactor, Size 3-32 with 40 HP motor.
7—Fuller Lehigh Mills, 57", 48" and 46" with motors.

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1—McCaslin Peck Carrier, 24" x 24" buckets, 221' c.c.
1—Link Belt Pan Conveyor, 36" wide x 70'6" long, 10 HP.
1—Link Belt 24" x 45" troughing belt conveyor.
1—Jeffrey 20" x 25' troughing conveyor.
1—Jeffrey Traylor 24" x 48" Pan Feeder.

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3—IR Imperial Vacuum Pumps 4188 cfm.
12—Centrifugal Pumps 4" to 16" with motors.
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900'—6", 9", 12" and 16" screw conveyors.
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4 ply 28 oz., ⅛ x 1/32, factory fresh
24".....**$3.09** (2—560' rolls)
30".....**$3.89** (1—554' roll)
Also, all sizes 14" to 30" from stock in 4 & 5 ply.

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3—60" by 20' Link Belt H.D. Mang. Apron Feeders	$12,500.00 ea.
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DRAGLINES, SHOVELS, CRANES, DRILLS, TRUCKS

9-W B.E. Elec. Drag, 200', 8 yd. or 160', 10 yd.
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7400 Marion Diesel Drag, 175', 13 yd.
625 Page Diesel Drag, 150', 10 yd.
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621-S Page Diesel Drag, 125', 7 yd.
183-M Marion Diesel Drag, 130', 8 yd.
200-W B.E. Diesel Drag, 125', 6 yd.
2400 Lima Elec. Drag, 130', 6 yd.
4500 Manitowoc Drag, 120', 5 yd. & 140', 4 yd.
7200 Marion Diesel Drag, 135', 5 yd.
2400 Lima Diesel Drag, 130', 6 yd.
120-B B.E. Elec. Drag, 115', 5 yd.
111-M Marion Drag, 100', 4 yd.
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1601 Lima 4 yd. Shovel/Drag
1201 Lima Drag, 85', 3 yd.
3900, 3500 & 3000 Manitowoc Cranes
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4161 Marion 6 yd. Elec. Shovel
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Model T-650 REICHdrill Truck Mtd. Rotary & Down-The-Hole
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Euclid Trucks, Dozers, Attachments, etc.

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Hazleton, Pa. GLadstone 5-3658

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DRAGLINES - SHOVELS
CRANES
All Makes and Models, ½ yd. to 35 yd.

EUCLIDS
Rear, Bottom Dumps and Scrapers
"Other equipment available not listed above"

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Construction Equipment
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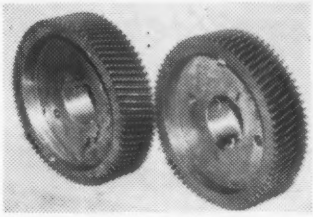

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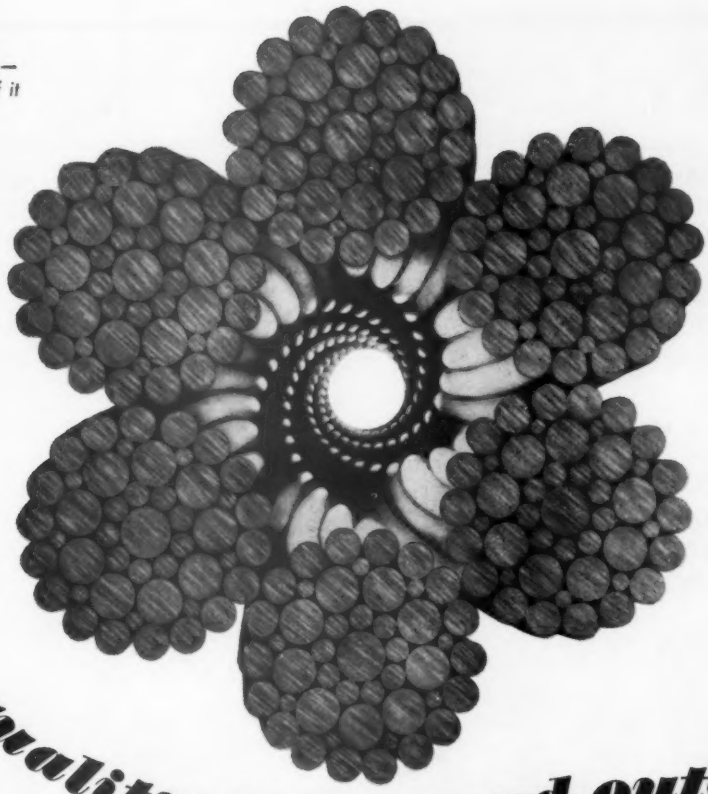

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Aerial view of new South African fluxstone plant shows terminal end of conveyor from the quarry. At right is the Dorr Torq Thickener.

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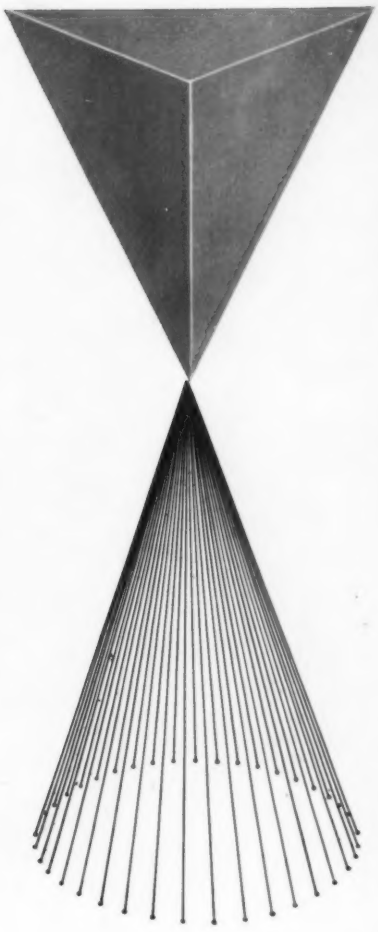

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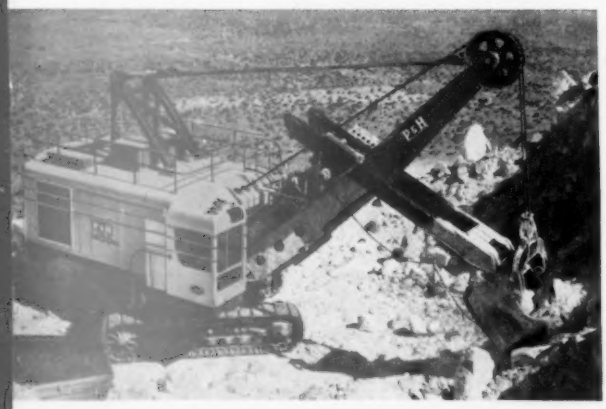

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